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Rebuilding after Emergency

Revamping Agricultural Research in Sierra Leone after Civil War

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ABSTRACT

The civil war in Sierra Leone, caused by a mix of political, social, and economic factors, had a huge impact on the overall economy in general and on the performance of the agricultural sector in particular. The agricultural research system of Sierra Leone was severely affected by the civil war. Research infrastructure was destroyed, laboratories were damaged and abandoned, and well-trained researchers and scientists fled from the country. With the cessation of hostilities in 2002, the government of Sierra Leone concentrated its efforts on the resettlement of displaced persons and on social and economic reconstruction. The efforts of the government include the rehabilitation and reorganization of the former National Agricultural Research Coordinating Council (NARCC), which was coordinating agricultural research in Sierra Leone.

The Sierra Leone Agricultural Research Institute (SLARI) Act was passed by the parliament of Sierra Leone in 2007 to replace NARCC. As a new organization, SLARI needed to make strategic decisions to guide its operations in order to make it effective in responding to the demands of stakeholders within the food and agriculture system. To provide a focus for SLARI and link its agenda to national development priorities, a strategic plan and operational plan were developed.

The methodology used to design the SLARI strategic plan applied an organizational innovation model through which the plan was nested within the strategic plan of the Forum for Agricultural Research in Africa (FARA) and Conseil Ouest et Center Africain pour la Recherche et le Développement Agricoles (CORAF) / West and Central African Council for Agricultural Research and Development (WECARD), and the operational plan was hinged on Comprehensive African Agricultural Development Program (CAADP) and Framework for African Agricultural Productivity (FAAP) principles. This would ensure synergy with regional and subregional strategies. The strategic plan would promote increased coordination, interaction, interlinkages, partnerships, and networks among the various agents associated with agricultural research for development systems in Sierra Leone. It would also help achieve SLARI's vision of increasing food security and wealth among Sierra Leone's rural population.

For SLARI to make a meaningful contribution to agricultural development in Sierra Leone, the operational plan must be implemented in such a way that the results envisaged in the strategic plan can be achieved. This requires funds and commitment from all stakeholders, especially the government of Sierra Leone.

Keywords: War, Agriculture, Development, Research, Strategic Plan, Operational Plan

ABBREVIATIONS AND ACRONYMS

AFRC	Armed Forces Revolutionary Council
ARC	Agricultural Research Center
CAADP	Comprehensive African Agricultural Development Program
CGIAR	Consultative Group on International Agricultural Research
CORAF	Conseil Ouest et Center Africain pour la Recherche et le Développement Agricoles
ECOWAS	Economic Community of West African States
FAAP	Framework for African Agricultural Productivity
FAO	Food and Agriculture Organization of the United Nations
FARA	Forum for Agricultural Research in Africa
GDP	Gross domestic product
GHI	Global Hunger Index
IAR	Institute of Agricultural Research
IAR4D	Integrated Agricultural Research for Development
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ISNAR	International Service for National Agricultural Research
MAFFS	Ministry of Agriculture, Forestry and Food Security
MFMR	Ministry of Fisheries and Marine Resources
NARCC	National Agricultural Research Coordinating Council
NARS	National Agricultural Research System
NEPAD	New Partnership for Africa's Development
RRS	Rice Research Station
RUF	Revolutionary United Front
SLARI	Sierra Leone Agricultural Research Institute
SLPMB	Sierra Leone Produce Marketing Board
SSA	Sub-Saharan Africa
SWOT	Strengths, weaknesses, opportunities, and threats
UNCTAD	United Nations Conference on Trade and Development
UN-NADAF	United Nations New Agenda for the Development of Africa
WARDA	Africa Rice Center
WECARD	West and Central African Council for Agricultural Research and Development

1. INTRODUCTION

At the turn of the 21st century, per capita income in Sub-Saharan Africa (SSA) was found to be 10 percent below the level reached in 1980 (UNCTAD 2001). Real economic growth remained well below the target of 6 percent per annum, identified by the United Nations New Agenda for the Development of Africa (UN-NADAF) as necessary for Africa to achieve sustainable economic growth.¹ Clearly, SSA countries have become worse off compared to their economic status in earlier years, and they are not able to meet recent targets set by different conventions.

From the mid-1960s until the end of the 1970s, Africa experienced moderate growth, with SSA exhibiting a notable acceleration of growth during the 1970s. This was especially due to the boom in commodity prices, foreign aid, and investment that exceeded 25 percent of gross domestic product (GDP) in many countries in the region. However, this growth was not sustained, and the economic performance of SSA countries deteriorated rapidly toward the end of the 1970s and early 1980s. A combination of adverse external factors and structural and institutional bottlenecks coupled with policy errors carried over the stagnation and economic decline into the first half of the 1990s. Moreover, the deterioration in socioeconomic conditions spilled over into political and civil unrest in some African countries.

Sub-Saharan African countries such as Sierra Leone, Guinea-Bissau, and the Democratic Republic of the Congo have only recently emerged from civil wars that have severely set back their development efforts. Such conflicts and other adverse factors (such as poor weather conditions and deterioration of terms of trade) have led to a loss of economic momentum in the region.

Civil war and conflict have been major constraints to achieving sustainable economic growth and development in SSA. In addition to sociopolitical unrest, conflicts in SSA countries have led to incalculable social and economic destruction. Poverty, hunger, malnutrition, and food insecurity are some of the major socioeconomic consequences of conflict. War and conflict destroy resources, prevent innovation, impede production, hamper market relationships, reduce income, and lead to food insecurity and malnutrition. These in turn lead to widespread deprivation, which creates citizens with little hope for a better future—making a vicious circle of political, social, economic, and environmental problems. The starting point for resuscitation is to give hope to people by restoring their livelihood, and there is no better way to do this than to rehabilitate the sector in which most of the people are employed, which is agriculture.

This discussion paper documents attempts to revamp agricultural research in Sierra Leone after civil war to enable it to play a meaningful role in increasing the productivity of smallholder farmers in the country. The next section provides general information on Sierra Leone and agricultural development. This is followed by a discussion of the growth prospects for the country. The civil war and attempts to rehabilitate the economy are discussed in the third section. The reorganization of agricultural research and future plans are presented, including a discussion of the development of the strategic plan and operational plan of the Sierra Leone Agricultural Research Institute (SLARI), which are aimed at streamlining and focusing agricultural research in Sierra Leone to improve smallholder agricultural productivity and production. Some concluding statements end the paper.

¹ UN-NADAF determined that an average real growth rate of at least 6 percent per annum was required for Africa to achieve sustained economic growth (UNCTAD 2001).

2. SIERRA LEONE

Sierra Leone is located in West Africa, with the capital, Freetown, on the coastal belt of the Atlantic Ocean. The country has three provinces, which are divided into 12 districts. The country has a total land area of 7.2 million hectares (FAO 2008), and the population totaled 5.5 million in 2007. The economy of Sierra Leone is predominantly agrarian, with agriculture employing about 70 percent of the population. The agricultural sector includes food crop and tree crop production, fishery, livestock, and forestry activities. Agriculture contributed about 45.0 percent of GDP in 2002, while industry and services' shares of GDP were 31.1 percent and 17.0 percent, respectively (MAFFS 2004).

Sixty-one percent of the population of Sierra Leone lives in rural areas. The rural population increased from 3.2 million in 2005 to 3.3 million in 2008, and it is projected to increase to 3.4 million by 2010 and stabilize at 3.3 million by 2014 (MAFFS 2004). In contrast, the urban population shows an increasing trend. The urban population of Sierra Leone increased from 1.9 million in 2005 to 2.1 million in 2008, and it is projected to increase to 2.3 million by 2010 and rise further to 3.0 million in 2014 (MAFFS 2004). Hence, by 2014 about 48 percent of the total population will live in urban areas. This is in line with increasing urbanization in Africa and the world. By 2050, Africa's population will be 1.96 billion, and, at a 4.5 percent rate of urbanization per year, most of the population will soon be living in urban areas. The world's population will increase by 40 percent, to 9 billion, by 2050, and about 60 percent of the population is expected to be living in urban areas within the next three decades (Cohen 2006).

The tremendous increase in the urban population in Sierra Leone and other parts of the world will generate excessive demand for resources, housing, social services, and employment, which may not be available. It is therefore important that attempts are made to slow the rural-urban migration by developing infrastructure, providing social amenities, making rural enterprises productive and profitable, and creating employment so that young men and women will decide to live in rural areas as a matter of choice.

In Sierra Leone, poverty and food insecurity form a vicious circle. Both poverty and food insecurity became widespread as agricultural productivity stagnated and the population grew at a faster rate than agricultural production. Using the national poverty line of Le 2,111 per day, the national poverty head count estimates that about 70 percent of the population of Sierra Leone are poor (Government of Sierra Leone 2004). About 68 percent of the population cannot afford enough food, and 26 percent are in extreme poverty. In addition, the poor in Sierra Leone can meet only about 71 percent of their basic needs (including food, money, shelter, clothing and safe drinking water as defined by the poverty reduction strategy paper of Sierra Leone).

Poverty is heavily concentrated in rural areas and in urban areas outside Freetown. About 75 percent of the population cannot afford enough food in the provincial states, as compared to 38 percent in Freetown (Government of Sierra Leone 2004). Rural areas contribute about 73 percent of the total incidence of poverty, implying that poverty is largely a rural phenomenon in Sierra Leone. According to the government of Sierra Leone (2004), the major causes of poverty are multidimensional. These include high unemployment, low economic growth, and poor social services.

Agricultural Development in Sierra Leone

The trend in agriculture's share of GDP confirms that agriculture is the mainstay of Sierra Leone's economy. Agriculture's contribution to GDP was 47 percent in 1996, 45 percent in 2000, and 40 percent in 2004 (MAFFS 2004). Sierra Leone has an agricultural land area of 2.8 million hectares, out of which 18.5 percent is arable land for perennial crops and the rest is for pasture (FAO 2008). Out of the total potentially cultivable lowland area of 1,060,000 hectares, 59.4 percent is inland valley swamps, 11.3 percent is bolilands, 10.4 percent is riverine grasslands, and

18.9 percent is mangrove swamps. The country has only 0.03 million hectares of irrigated cropland. Even though irrigated cropland comprises only 5.5 percent of arable land, this compares favorably with the average for other West African coastal countries, of 1.0 percent, and for Africa, of 3.0 percent.

The crops subsector dominates the agricultural sector. The contribution of the crops subsector to agricultural GDP increased from 62 percent in 1996 to 66 percent in 2000 and then reverted to 62 percent in 2004 (MAFFS 2004). The second dominant subsector, fisheries, contributed about 27 percent to agricultural GDP in 1996, declined to 21 percent in 2000, and then increased slightly to 23 percent in 2004 (Table 1). Forestry contributed only about 6 percent to agricultural GDP in 1996 and increased to 9 percent in 2000 and to 10 percent in 2004. Livestock had the smallest share in agricultural GDP, at 5 percent in 1996; this figure dropped to 4 percent in 2000 and moved back to 5 percent in 2004.

Table 1. Contribution of major agricultural subsectors to agricultural GDP (%)

Subsector	1996	1997	1998	1999	2000	2001	2002	2003 (Forecast)	2004 (Forecast)
Crops	62	64	64	67	66	66	64	64	62
Fishery	27	23	23	21	21	21	22	22	23
Forestry	6	7	7	8	9	9	10	10	10
Livestock	5	6	5	4	4	4	4	4	5

Source: MAFFS (2004)

Small-scale producers dominate farming operations in Sierra Leone. They operate on farm sizes averaging 1.63 hectares, with holdings made up of 60–80 percent uplands and 20–40 percent lowlands (MAFFS 2004). Food crop production is the main source of livelihood in Sierra Leone for over 75 percent of the country's population. About 680,000 hectares of land (just over 10 percent of cultivable area) is cropped each year (FAO 2008). The combination of customary and statutory land laws has permitted the coexistence of traditional farming with the establishment of tree crop plantations.

The Agricultural Sector Review (MAFFS 2004) summarized the constraints facing the agricultural sector as follows:

- Increased pressures and threats to macroeconomic stability over the medium term
- Declining soil fertility and low crop productivity (no sustainable alternative has been found to the traditional bush fallow system in the uplands)
- An inadequate research system
- Poor extension services
- Poor and inadequate rural infrastructure
- A lack of agricultural finance

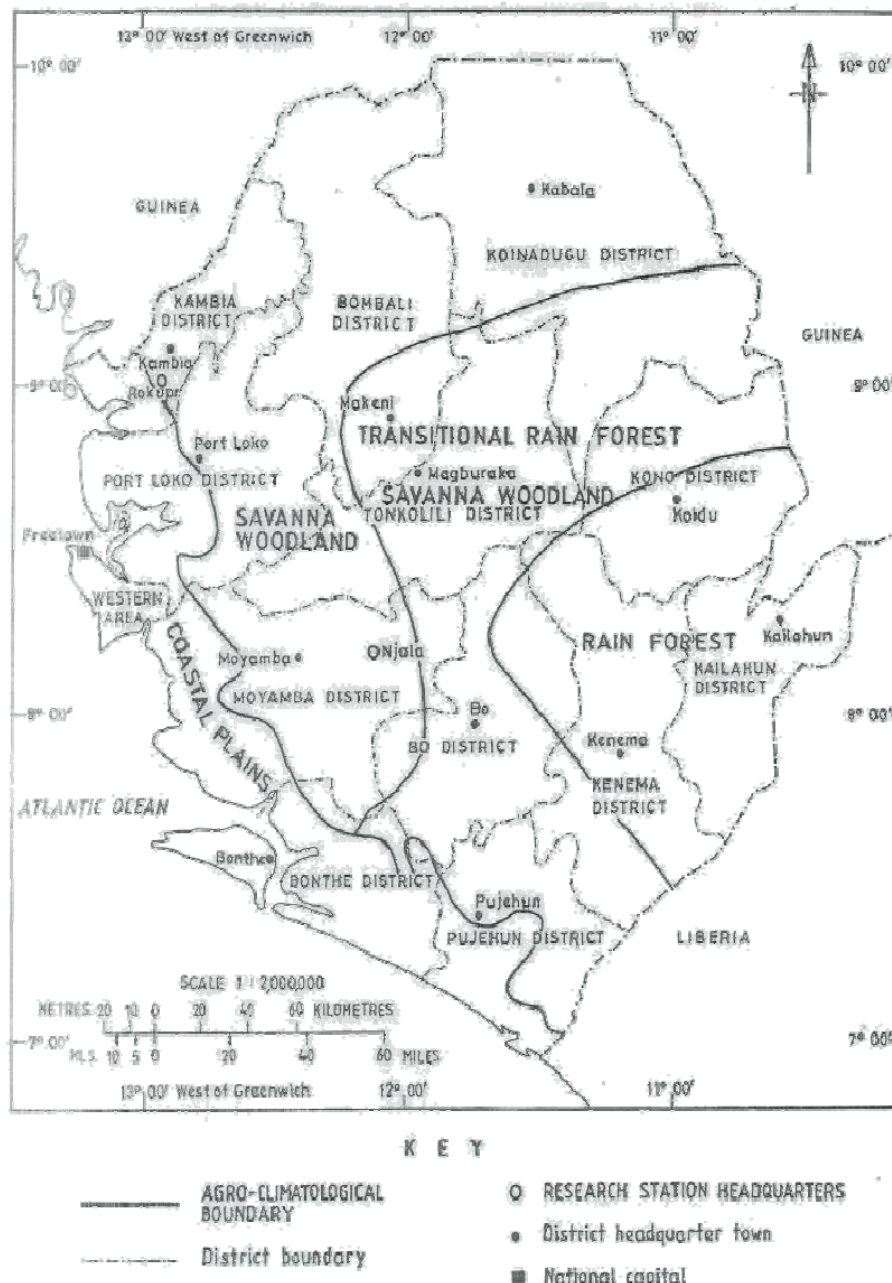
Agro-Ecological Zonation

There are five main agro-ecological zones in Sierra Leone: coastal plain, savanna woodland, rain forest / savanna, rain forest, and hills (Figure 1). The “bush fallow” rotational farming system is the predominant system. Almost 80 percent of the cropped land is found in the uplands. All the major food crops are produced through this system, in which up to 15 different crops (sorghum, millet, maize, benniseed, groundnut and other grain pulses, cassava, sweet potato, and vegetables)

are traditionally grown in mixed stands, with rainfed upland rice dominating. More permanent cropping is practiced for tree crop plantations in the eastern and southern uplands of the country. Food crops are cultivated on the relatively more fertile low wetlands (mainly in the northwestern and southern areas).

The climate in Sierra Leone is monsoon-type humid tropical with two distinct seasons. The rainy season spans May–October and the dry season November–April. Annual rainfall averages about 3,000 millimeters, ranging from a low of 2,000 millimeters in the north to a high of 4,000 millimeters in the south. The average monthly temperature ranges from 23 to 29 degrees Celsius, with a maximum of 36 degrees in the lowlands toward the end of the dry season and a minimum of 15 degrees in the highlands at the beginning of the dry season.

Figure 1. Agro-ecological zones of Sierra Leone



Food Crop Production

The major annual food crops in Sierra Leone are rice, cassava, maize, millet, sorghum, sweet potato, and groundnut. Rice is the major staple crop grown by most of the small-scale farm households. In 1975, Sierra Leone experienced self-sufficiency in rice, with production of over 600,000 tons of paddy recorded at the end of the 1970s. Throughout the 1980s, average production levels were in the range of 430,000–524,000 tons per year (FAO 2008).

The civil war had a tremendous adverse effect on rice production. Rice production fell from 503,000 tons at the beginning of the civil war in 1991 to 355,000 tons in 1995 and 360,000 tons in 2001, mainly due to a decrease in the area planted and harvested (FAO 2008). After the war, rice production improved due to the resettlement of farmers on their respective farms, which led to a slight increase in the area planted and harvested. Consequently, production increased to 542,000 tons in 2004 and to 1,062,000 tons in 2006 (Table 2). From 1980 to 2006, rice yield ranged widely between 1 and 4 tons per hectare, with an average of 1.5 tons per hectare.

Comparing the irrigated rice yield of Sierra Leone with that of other West African countries, the average yield level in Sierra Leone stands at 2.33 tons per hectare and at 2.91 tons per hectare for the West African region (IFPRI 2006; Table A.1). Guinea, a neighboring country, had a higher irrigated rice yield, of 3.3 tons per hectare, within the same period. This shows that even if rice is a major crop for Sierra Leone, the country lags behind other West African countries in productivity of irrigated rice. For rainfed rice, Sierra Leone's yield of 1.4 tons per hectare compares favorably to the average for West Africa and for neighboring countries (Table A.2). This implies that Sierra Leone has a competitive advantage in producing rainfed rice in West Africa, and this should be exploited as an export crop targeted at the subregion. Continued production of irrigated rice depends upon improvements in yield if Sierra Leone is to compete with other West African countries that produce rice.

Even though rice is the first choice for meeting the farm family's food needs, non rice food crops (other cereals, root and tuber crops, grain legumes, vegetables) play an important role in the diets of farmers in Sierra Leone. Non rice food crops are especially common in upland farming, as they substitute for rice during the lean period and provide for cash.

Table 2. Production of major annual crops ('000 metric tons) (1980–2006)

	Rice, paddy	Cassava	Maize	Millet	Sorghum	Sweet potatoes	Groundnut (unshelled)
1980	513	95	12	14	11	12	10
1981	500	97	14	16	11	12	10
1982	523	100	15	16	12	12	15
1983	460	105	15	22	16	12	11
1984	504	100	14	23	19	13	15
1985	430	110	14	23	20	13	13
1986	524	113	8	23	20	13	25
1987	465	114	11	20	19	13	21
1988	493	116	11	21	20	14	18
1989	517	117	11	22	21	14	20
1990	503	123	12	23	22	14	20
1991	503	123	11	22	21	14	21
1992	478	117	10	22	22	14	19
1993	486	105	9	21	24	13	19

1994	405	243	8	26	23	43	39
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Table 3. Production of major annual crops ('000 metric tons) (1980–2006) (continued)

	Rice, paddy	Cassava	Maize	Millet	Sorghum	Sweet potatoes	Groundnut (unshelled)
1995	355	219	8	23	18	45	37
1996	391	281	8	20	20	46	35
1997	411	309	9	21	21	50	37
1998	328	289	8	16	17	42	35
1999	247	239	8	4	17	20	29
2000	199	240	8	3	8	28	14
2001	360	300	10	7	10	25	30
2002	422	340	12	10	18	25	58
2003	445	377	16	10	21	25	70
2004	542	390	32	15	15	25	91
2005	738	390	39	20	14	26	104
2006	1062	350	48	25	14	26	115

Source: FAO (2008)

The second major annual food crop in Sierra Leone is cassava (*Manihot esculenta*). Cassava is grown throughout the country in the uplands and in inland valley swamps. Cassava production ranged between 95,000 and 117,000 tons in the 1980s (FAO 2008). At the beginning of the civil war in 1991, cassava production stood at 123,000 tons, and by the end of the war (2001) it reached 300,000 tons. The civil war did not seem to affect production of cassava, unlike rice. By 2004, cassava production was 390,000 tons, and it declined slightly to 350,000 tons in 2006 (Table 2). From 1980 to 2006, yield of cassava ranged between 3 and 6 tons per hectare, with an average of 4.9 tons per hectare. This level of yield is lower than the average for West Africa, of 7.7 tons per hectare (IFPRI 2006; Table A.2), implying that there is a need to invest in technology development to enhance cassava yields in Sierra Leone to make it competitive in West Africa.

Maize, sorghum, and millet are grown as rainfed or dry-season crops in rice growing areas. Maize is often grown as a mono crop after rice in the inland valley swamps but is also grown in gardens near house compounds. The area harvested for maize is small compared to the areas harvested for other crops such as sorghum and millet. The average area harvested for maize during 1980–2006 was only 11,107 hectares (FAO 2008). The war had little effect on the production of maize, but the crop exhibited tremendous growth after the war. In 1991, maize production was 11,000 tons, and it declined to 10,000 tons by 2001 (Table 2). Production increased to 32,000 tons in 2004 and to 48,000 tons in 2006. Sierra Leone's yield of rainfed maize is lower than the West African average, and its yield level is lower even when compared to neighboring countries such as Guinea (Table A.2). Short-duration varieties of maize are largely consumed fresh as a vegetable by humans, due to the difficulty of drying the grains during the wet season. The long-duration varieties mature in the dry season, and the grains are dried; a large share of this crop goes into animal feed.

Sorghum and millet are grown mixed with other crops in the first or second year of cropping after bush fallow in upland areas. During 1985–2006, the average area cultivated per annum for sorghum was 20,067 hectares, with an average yield of 1.1 tons per hectare, as compared with 18,546 hectares and a yield of 1.0 ton per hectare for millet (FAO 2008). Almost

all the production of sorghum and millet are used for home consumption. Rainfed sorghum and millet have higher yield levels compared to the average for West Africa and for neighboring countries (Table A.2).

Tree Crop Production

The major perennial crops of Sierra Leone are citrus, cocoa, coconut, coffee, oil palm fruit, and sugarcane. Oil palm has the highest level of production. Oil palm forms an integral and valuable part of the upland farming system. It grows in most parts of the country and is a major volunteer species in bush fallow systems after forest clearing. As Table 3 shows, production of oil palm remained around 250,000 tons from 1980 to 1991 and declined gradually during the civil war years to 180,000 tons in 2001 (FAO 2008). Production, however, did not improve after the civil war; rather, it continued to decrease, to 174,000 tons in 2004 and to 166,000 tons in 2006. The small-scale traditional system relies mainly on the harvesting of fresh fruit bunches from wild plants. Old oil palm trees are tapped for palm wine, which provides refreshment for farm households and additional income when sold.

Citrus and sugarcane are the dominant perennial crops after oil palm. Production of citrus (mainly orange and lemon) increased steadily, from 60,000 to 85,000 tons, from 1980 to 2006 (Table 3). The civil war seemed not to have affected citrus production, as it showed a slight increase from 77,000 tons in 1991 to 80,000 tons in 2001. In contrast, production of sugarcane was reduced significantly during the period of civil war. Sugarcane production declined from 70,000 tons in 1991 to 24,000 tons in 2001. After the civil war, production picked up to 28,000 tons in 2003 and to 70,000 tons in 2006.

Sierra Leone also produces perennial crops such as coffee, cocoa, and coconuts. Coffee production recorded a decrease during the period of the civil war, from 26,000 tons in 1991 to 17,000 tons in 2001 (Table 3). The downward trend in coffee production continued even after the war, with production declining to 16,000 tons in 2004 and to 15,000 tons in 2006. Cocoa production decreased sharply during the war, from 24,000 tons in 1991 to 10,000 tons in 2001. Production gradually picked up during the years after the war, to 12,000 tons in 2003 and to 13,000 tons in 2006. Since both coffee and cocoa are labor-intensive ventures, it was not surprising that production declined so much with the desertion of villages by farmers during the war. Whereas coffee does not require massive rehabilitation to recover, cocoa trees must be sprayed against insect pests and fungus, mistletoe must be cut off, some diseased trees must be eliminated, and weeding must be intensified to restore the vigor of the trees and obtain the normal yield of cocoa pods or beans.

Table 4. Production of major perennial crops ('000 metric tons) (1980–2006)

	Citrus fruit	Cocoa beans	Coffee, green	Coconuts	Oil palm fruit	Sugarcane
1980	60	8	10	2	250	NA
1981	62	9	9	2	250	50
1982	65	15	8	2	250	80
1983	67	12	16	2	250	80
1984	66	16	18	2	250	70
1985	68	18	26	2	250	70
1986	70	20	23	2	250	70
1987	70	23	24	2	250	70
1988	73	23	25	2	250	70

Table 5. Production of major perennial crops ('000 metric tons) (1980–2006)

	Citrus fruit	Cocoa beans	Coffee, green	Coconuts	Oil palm fruit	Sugarcane
1989	77	24	25	2	250	70
1990	77	24	25	2	250	70
1991	77	24	26	2	250	70
1992	77	5	26	2	235	49
1993	75	5	24	2	235	24
1994	75	11	27	2	231	56
1995	75	10	25	2	225	21
1996	75	10	25	2	238	21
1997	75	13	30	2	245	21
1998	77	13	26	2	200	21
1999	80	10	15	2	175	21
2000	80	10	15	2	175	21
2001	80	10	17	2	180	24
2002	80	11	17	2	180	24
2003	85	12	18	2	195	28
2004	82	9	16	2	174	70
2005	82	8	15	2	166	70
2006	82	13	15	2	166	70

Source: FAO (2008)

NA = not available

Climatic conditions prevailing in Sierra Leone (five dry months and three months of low sunshine) pose a limiting factor to high yields of perennial crops in most parts of the country. The best conditions are found in the southeastern part of the country (well-distributed rainfall; high mean temperatures; high humidity; and deeper, well-drained, gravel-free soils with good water-holding capacity) and become progressively less suitable toward the west and the north.

The Food and Agricultural Organization of the United Nations (FAO) estimated in 1985 that the area under cocoa cultivation amounted to some 41,600 hectares, 87 percent of which is found in Eastern Province (MAFFS 2004). Robusta coffee is grown in the same ecological conditions as cocoa. Although coffee is less demanding than cocoa (a dry spell in December to February is considered beneficial for resting and for the development of flowering buds) and a wider ecological distribution is feasible, the bulk of coffee production (73 percent) is still found in Eastern Province (MAFFS 2004).

Other perennial crops include bananas, plantains, coconuts, kola nut, rubber, and other horticultural crops. Although bananas and plantains are important food items and sources of income throughout the country, they have been generally neglected by public services. Coconuts are a small-scale local industry, with most of the production sold in local markets. Kola nut and rubber are produced on a very small scale, with the latter having good potential as an industrial input (MAFFS 2004). Horticultural crops such as mango, papaya, and pineapple are popular with farmers and consumers alike and have the potential for further development and for considerably improving farmers' incomes.

When compared with the West African subregion, Sierra Leone obtains higher yields for most of the perennial crops such as banana, sugarcane, cocoa, coffee, and oil palm (Table A.2).

As these crops are the main exportable commodities of Sierra Leone, the country has a comparative advantage vis-à-vis other West African countries in producing them.

Fisheries

The total coastline of Sierra Leone is 570 kilometers (210 miles) long. The country has a continental shelf area of 25,600 square kilometers, which is 140 kilometers wide at the northern end and 32 kilometers at the southern end. Sierra Leonean waters are generally believed to provide rich fishing grounds for a wide variety of fish, including high-value species such as shrimp, lobster, cuttlefish, bream, and snapper. In addition to the marine resources, the country is endowed with inland waters including rivers, lakes, and floodplains.

The fisheries of Sierra Leone constitute three major sectors: artisanal fisheries, industrial fisheries, and inland fisheries and aquaculture. The artisanal fisheries operate in estuaries and coastal waters extending from the shoreline to a depth of 15–45 meters and involve more than 18,000 fishermen (MFMR 2003). Artisanal fishery contributes significantly to the total national fish production and is mainly used for local consumption. The major species are pelagic fish species.

Industrial fisheries operate in the open deep waters and are characterized by multinational fleets that include trawlers, shrimpers, long liners, canoe support vessels, and carriers. These are basically foreign-owned vessels operating in joint-venture arrangements with Sierra Leonean nationals. This subsector is mainly export-oriented.

Inland fisheries and aquaculture operate in rivers, lakes, floodplains, and swamps. Aquaculture takes place mostly in swamps and wetlands. Sierra Leone has many streams, nine major river systems, a number of lakes, creeks, lagoons, and small estuaries. Fishing activities, with varying but generally low intensities, are conducted in these inland water bodies. The fisheries of these inland water bodies are believed to have great potential, with estimated sustainable potential yield ranging from 16,000 to 40,000 tons per annum (MFMR 2004).

Table 4 shows that total annual artisanal fish production ranged between 40,000 and 53,000 tons from 1983 to 2002 (MFMR 2004). In contrast, industrial fish production ranged from 11,000 to 185,000 tons during the same period. The maximum harvest of industrial fish production, of 185,000 tons, was obtained in 1989 (before the war). Industrial fish production decreased sharply during the war, to a low of 11,000 tons in 1997. This was mainly due to the withdrawal of a large proportion of the Soviet fleet of purse seine vessels. The number of licensed demersal vessels also decreased drastically in 1991 and has not increased again.

In contrast, artisanal fishery did not exhibit much change in production during the war. Before the war started, average fish production from artisanal fisheries was 45,800 tons per annum (MFMR 2004). During the war period, fish production ranged between 40,000 and 47,000 tons per annum, with an average of 45,900 tons per annum. In the year following the war, artisanal fish production increased to 53,000 tons (Table 4). Even though fishermen were reported to have lost fishing boats and fishing equipment during the war, the available catch assessment data for the period do not reflect this.

Postwar development activities in the fisheries sector have gone a long way to resettle fishermen whose livelihoods were disrupted by the war. Apart from the emergency programs, the sector benefited from the Highly Indebted Poor Countries (HIPC)² relief funds that the government used to provide fishing inputs and fund the construction of ovens in many active coastal fishing communities, which were deemed to be efficient, low-cost, and less hazardous to human health. In addition, the Artisanal Fisheries Development Project provided complete fishing

² The HIPC initiative is a comprehensive approach to debt reduction for heavily indebted poor countries pursuing adjustment and reform programs supported by the International Monetary Fund and World Bank. Many sectors benefited from this initiative, which later became the Poverty Reduction Strategy process.

units to cooperative members in most coastal districts and trained fish processors in fish handling and processing techniques.

Table 6. Artisanal and industrial marine fish production ('000 metric tons) (1983–2002)

Year	Artisanal	Industrial	Total
1983	47	79	126
1984	43	135	178
1985	44	156	200
1986	44	157	201
1987	45	182	227
1988	46	176	222
1989	48	185	233
1990	50	180	230
1991	44	75	123
1992	47	54	101
1993	47	33	80
1994	47	18	65
1995	47	16	63
1996	47	17	64
1997	47	11	58
1998	47	13	60
1999	46	16	62
2000	46	14	60
2001	40	23	63
2002	53	14	67

Source: MFMR (2004)

Sierra Leone's fish exports are mainly from industrial fish production. Exports constitute only 10 percent of artisanal fish production, while the bulk of production is consumed locally. According to the report *Fisheries of Sierra Leone*, fish exports after the war period picked up slowly, increasing from 1,025 tons in 2002 to 1,800 tons in 2007 (MFMR 2004). Likewise, the export volume of shrimp showed a slight increase, while exports of other shellfish decreased as compared to figures in 2002 (Table 5).

Table 7. Fish exports from Sierra Leone (metric tons) (2002–2007)

Year	Fish	Shrimp	Other shellfish
2002	1,025.06	1,187.01	3,180.13
2003	1,404.11	1,343.11	2,845.91
2004	1,304.05	1,620.80	1,987.32
2005	754.20	1,281.13	1,117.68
2006	1,259.96	1,264.50	1,720.12
2007	1,800.87	1,248.24	1,233.11

Source: MFMR (2004)

The fishery subsector faces various constraints to reaching its full potential. Sierra Leone lacks suitable land-based facilities for producing fish export products. The lack of suitable preservation facilities to keep fish fresh and the absence of suitable road networks for the efficient transportation of exportable fish are some of the constraints. These have an adverse effect on the utilization of potential export markets due to the inability to meet the import standards set by the international market. As a consequence, the European Union has banned imports of fish from Sierra Leone.

Another constraint is intensive exploitation of some species of the fish stock.³ This is a result of the widespread use of harmful fishing methods such as channel nets, beach seines, and small-mesh-size nets in artisanal fishery. In addition, mangroves, which serve as the nursery grounds and an important source of nutrients for young fish, are cut down and used as construction material and fuel wood for cooking and fish smoking.

Livestock

Traditional livestock in Sierra Leone consists of cattle, small ruminants, pigs, and poultry. According to the 1979 livestock census, the country had about 333,200 head of cattle, 264,000 sheep, and 145,000 goats (MAFFS 2004). Pigs were estimated at 17,000 head and poultry was estimated at 3 million birds. Recent estimates after the civil war indicate that there are 102,000 head of cattle, 79,200 sheep, 43,500 goats, 5,100 pigs, and 900,000 birds. These figures clearly show that the civil war had a devastating impact on livestock populations, destroying more than 70 percent of the national herd.

Cattle production is the most important livestock activity in the country. It is almost exclusively dominated by the Fula ethnic group (*Fulani*). The cattle population is confined to the north of the country, and although some non-Fula ethnic groups own cattle they often entrust their livestock to the Fula on pay or produce-sharing arrangements. Most of the cattle that come to Sierra Leone for trade or for settlement come from Guinea. Herds of cattle destined for sale are transported to the markets and abattoirs by trucks or are trekked on foot.

Sheep occupy the second place in livestock population, after cattle. They are more widespread than cattle and are generally owned by many ethnic groups in the country. The sheep are of the Djallonke breed, which has successfully adapted to the prevailing environmental conditions in the region.

Goats are the most widely distributed of all the ruminant species and are found all over the country. There are, however, concentrations of small ruminants in Northern Province, where almost 60 percent of the national flock of goats is found. The goats are of the indigenous West African dwarf breed, which is available throughout the West African region.

Poultry farming in Sierra Leone comprises mainly domestic fowl, with smaller numbers of guinea fowl and Muscovy ducks in some areas. Fowl are the only species in Sierra Leone not subject to any social, cultural, or religious taboos and are owned by a wide spectrum of families. In rural areas, the rearing of indigenous chickens is commonly left to women and children. These chickens feed on domestic residues and do not require any special investment. There is some development of semi-intensive and semicommercial egg production units throughout the country, and a few units close to urban areas practice the intensive production of layers. These units rear commercial hybrids imported from Europe as day-old chicks. Currently, there is no commercial production of broilers in Sierra Leone.

Traditional smallholder livestock farming is the predominant animal husbandry system practiced in Sierra Leone. However, peri-urban livestock farming has become a very popular

³ It is believed that there was serious threat to the stocks of bonga (*Ethmalosa fimbriata*), herring, and *Sardinella* species from artisanal fishery and to *Dentex angolensis*, *D. congensis*, and *D. canarensis* from industrial fishing in the 1980s.

activity since the civil war. Many people keep livestock in the peri-urban residential areas in many towns of Sierra Leone. The peri-urban livestock population has been growing, partly because many people moved into towns during and after the civil war, and some of them moved together with their livestock. Peri-urban livestock will contribute considerably to the national livestock populations when livestock production programs are established. There is no large-scale commercial livestock farming in Sierra Leone; although the country has all the ingredients required for this activity, it lacks the financial and technical know-how at the moment.

Poultry and pig farming is one of the easiest ways of empowering small-scale farmers in areas with high population densities. Under the prevailing conditions in Sierra Leone, farmers should be encouraged to engage in this activity because it does not require large tracts of land and the production per land unit is very high. Furthermore, it is possible to mobilize resources quickly for poultry and pig projects, as they have very short production cycles; provide much-required employment; and provide meat products, which are in high demand in Sierra Leone.

Sierra Leone is endowed with a wide variety of animal feed, which includes crop residues and agroindustrial by-products. The two main commodities used in the manufacture of animal feed (largely poultry and pig feed) are maize and fish. Previously, there was a shortage of maize in the country, which necessitated importation. Furthermore, due to foreign exchange earnings, the fishing industry has tended to sell large quantities of fish to foreign companies, a situation that has prompted an acute shortage of fish in Sierra Leone, for both human and animal consumption. Other commodities that are available in the country and that could be used as feed include root crops and fruits such as citrus and mango.

The marketing of livestock products in Sierra Leone is not a big issue because there is very little to market in the first place. Demand for livestock products greatly outstrips domestic supply, and imports of livestock products are high. Meat and meat products are among the country's major food imports. Although there are no reliable data available on the importation of these products, available information indicates that meat, meat products, and live animals made up between 13 and 30 percent of total imports from 1983 to 1986.

In general, with regard to food crop production, Sierra Leone has a comparative advantage with rainfed rice, cassava, sorghum, and millet, and this must be exploited for subregional trade. With respect to perennial crops, Sierra Leone obtains higher yields for banana, sugarcane, cocoa, coffee, and oil palm. These are the main exportable commodities of the country, and the country has a comparative advantage vis-à-vis other West African countries in producing them. This implies that national agricultural research institutes should focus on providing research support and technological solutions to problems with these priority commodities.

Agricultural Marketing

Domestic Trade. Until the early 1990s, the Sierra Leone Produce Marketing Board (SLPMB) monopolized the agricultural marketing system, with both input and output markets managed by the government. Under the Structural Adjustment Program of the World Bank, countries moved away from public marketing boards and allowed the private sector to be the main engine of economic growth, including production and marketing.

After the liberalization of the marketing system, the private sector, mainly small operators, dominated the marketing of food crops in Sierra Leone. However, the success of the private sector depends upon the availability of complementary services and infrastructure such as roads. Inadequate provision of infrastructure in Sierra Leone limited private sector operations in food marketing to a very few areas in the country and, therefore, worsened market integration.

Road infrastructure, which had started deteriorating before the war, has worsened due to neglect and has made many food producing areas inaccessible. Many community market structures were destroyed or left to decay during the war, and some are being rehabilitated. In all

community markets, market stalls are owned by traders in agricultural commodities and not by farmers. Farmers are therefore unable to sell to consumers except through the traders.

Rice, being the major staple crop in Sierra Leone, benefited from government support and intervention at various levels of its marketing. The Ministry of Trade was involved in rice trade during the colonial and early postcolonial periods. The Rice Department, the Rice Corporation, and SLPMB were involved in rice trading. The operations of the SLPMB covered a number of commodities, including both local and imported rice. However, the local rice operation of the SLPMB was rather unsatisfactory, as less and less local rice was sold to it because of the unattractive floor prices set by the government for local rice. Rice imports increased, however, with the injection of more foreign exchange by the SLPMB, reaching some 123,000 tons in 1991 (excluding 28,000 tons of food-aid rice) from a paltry 20,000 tons of total imported rice in 1965 (MAFFS 2004). With the government providing a subsidy for concessionary rice, which was then sold at low prices to specified institutions (e.g., army, police, hospitals), groups, and individuals, the rice trade became more profitable and attracted more private operators.

Starting in 1987, the monopoly of SLPMB in the rice trade declined considerably when its foreign reserves from cocoa and coffee trade plummeted due to low world prices; it later ceased operation. By the late 1980s, the private sector had assumed a dominant role in the marketing of both local and imported rice in Sierra Leone. However, the estimated proportion of local rice that has been marketed since the 1980s has averaged about 20 percent of annual production, implying that most of the rice produced locally is consumed by farm households. Since the war, the marketing of rice in Sierra Leone has not fundamentally changed, except that the volumes of local rice production are much lower now than before the war, for various reasons (e.g., the destabilization of farm households).

Apart from rice, the major agricultural commodities sold by farmers in Sierra Leone are maize, cassava, groundnuts, and vegetables. The structure of the market generally follows a producer-wholesaler-retailer-consumer pattern. Palm oil is generally sold in the domestic market through itinerant traders who resell to retailers who then sell to consumers. Both frozen and smoked fish, mainly from artisanal fishing, follow a complex but well-developed marketing system. Itinerant traders move large quantities of smoked fish across many community periodic markets, ensuring that fish reach all communities. Even though the war disrupted the fish marketing system, it picked up well again after the war.

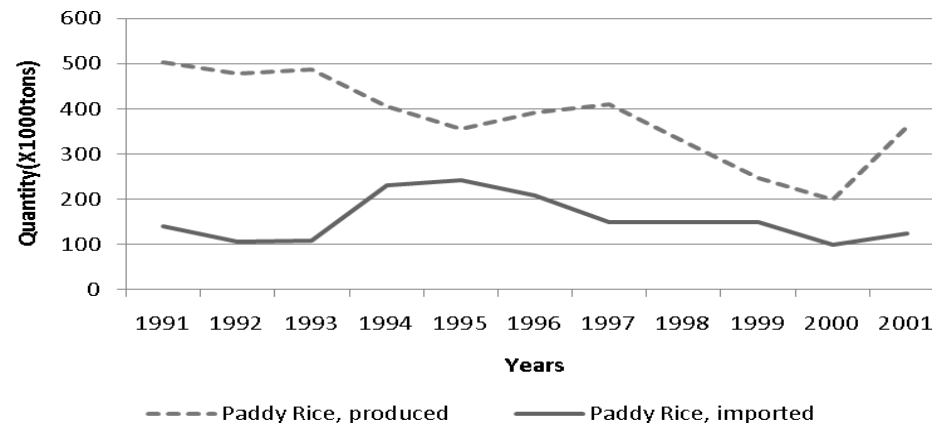
International Trade. Sierra Leone is categorized as a net importer of annual crops such as milled paddy rice, maize, and, very recently, unshelled groundnuts. Onion and vegetable oil are also imported. The country exports vegetables, fruits, and fish (pelagic fish and a small amount of demersal fish). In addition, perennial crops provide the most important agricultural export commodities, including cocoa, coffee, oil palm, ginger, and piassava. The bulk of agricultural exports come from the eastern part of the country.

About 10,240 tons of coffee were exported in 1985 (FAO 2005). Table 6 shows that during the years of the war, coffee exports declined sharply, to an average of 3,230 tons, and did not pick up quickly after the war. Rather, exports declined further, to 2,040 tons in 2003 and to 950 tons in 2004. Cocoa exports registered a volume of 10,220 tons in 1985, and then declined during the war, to an average of 4,090 tons. After the civil war, cocoa exports increased to 7,400 tons in 2004.

In addition to the formal exports, a great deal of informal trade of cocoa and palm oil takes place with neighboring countries such as Guinea and Liberia. This is attributed to bad road networks for traders or farmers to transport produce to distant internal market centers. Instead, they find it easier to transport produce to nearby national borders. This includes informal rice border trade as well. After the civil war, the volume of imported rice, including food aid, increased to make up for the shortfalls in local rice production (Figure 2). Apart from cereals, Sierra Leone imports many animal products, compared to its local production potential, including

pelagic fish, eggs, milk, and bovine meat. It also imports small amounts of demersal fish and freshwater fish.

Figure 2. Trends in rice imports and local production during civil war (1991–2001)



Source: FAO (2008)

Table 8. Export and import quantities of perennial crops ('000 metric tons) (1985–2004)

Export	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Cocoa Beans	10.22	9.08	9.07	9.03	8.20	5.00	13.00	4.00	4.02	3.40	3.00	4.00	3.00	3.03	3.07	2.00	2.50	3.06	5.08	7.40
Coffee, Green	10.24	7.40	6.08	8.03	5.25	8.20	6.20	4.32	3.30	4.07	5.00	2.00	3.00	3.00	1.40	2.10	1.24	3.20	2.04	0.95
Coconuts	0.00	0.00	0.06	0.06	0.00	0.02	0.01	0.03	0.10	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.00	0.05	0.05
Citrus Fruit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil Palm Fruits	0.60	1.00	1.20	1.40	0.90	1.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sugar-cane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Import																				
Cocoa Beans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.43	1.43	1.43
Coffee, Green	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coconuts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Citrus Fruit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil Palm Fruits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.08
Sugar-cane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: FAO (2005)

Growth Prospects for Sierra Leone

Agriculture will continue to be the mainstay of Sierra Leone's economy, followed by mining. The draft 2007 Agriculture Sector Policy of Sierra Leone outlines the broad objectives and strategies of the government in pursuing its overall goals of poverty alleviation and food security. The overall policy is aligned with the Millennium Development Goals, Sierra Leone's poverty reduction strategy paper, the Comprehensive African Agricultural Development Program (CAADP), and the Framework for African Agricultural Productivity (FAAP). The primary objective of the government's agricultural policy is to promote sustained growth of agricultural output in order to restore food security and generate tradable agricultural surplus. Hence, the agricultural policy pays particular attention to increasing food production in order to attain food security through a multipronged approach. Attempts have been made to improve access to and the quality of extension services to afford farmers knowledge and information on improved techniques, and improved postharvest technologies, including milling and storage facilities. Over the medium term, the goal will be to increase income and productivity by increasing investment in feeder roads and basic services such as education, health, and land reform.

In 2008, the objective of the government of Sierra Leone was to improve productivity in the agricultural sector through the provision of farm inputs, community infrastructure, and extension services, as well as enhancing access to rural finance and improving rural roads. The government also planned to create an environment conducive to private sector investment in the agricultural sector. This is in line with the vision of the Ministry of Agriculture, Forestry and Food Security (MAFFS), that is, "to promote food security and poverty alleviation from a human livelihood aspect and to make agriculture the engine of socioeconomic growth and development in Sierra Leone, especially through private sector promotion."

Regarding crop production, the government plans to achieve food self-sufficiency using rice and cash crops in which the country has a comparative resource advantage, while conserving natural resources. Improvements in the productivity of food and cash crops can be achieved through the support of small-, medium-, and large-scale farming. The Agriculture Sector Review (MAFFS 2004) noted that the development of the agricultural sector was expected to stimulate growth in other sectors due to its backward (demand for tools and other inputs such as agrochemicals) and forward (supply for agro-based industries as well as agricultural marketing) linkages with other sectors.

In terms of trade, tree crops have a huge potential for export and foreign exchange earnings. The main crops in the country are cocoa, coffee, oil palm, and kola nut, followed by rubber and cashew. The Port of Freetown, an important center of trade for many countries, offers huge potential for international trade for Sierra Leone. Government policy is committed to privatization and trade liberalization in its broad framework, in both agricultural input and output marketing. The government therefore sees its role as creating an enabling environment to facilitate the activities of the private sector (including nongovernmental organizations [NGOs] and farmer organizations) in the marketing of agricultural produce.

In the fishery subsector, the country can make use of significant untapped resource potential. The total potential sustainable yield from marine fisheries capture is estimated at 112,000–180,000 tons, and the current total production stands at 67,000 tons per annum (MFMR 2003). This shows a gap of 45,000 tons of untapped fish resources that can be harvested annually. Greater attention and effort are needed for the efficient management and sustainable development of fisheries. Government fishery policy regarding the small-scale fisheries sector is mainly geared toward alleviating poverty through the promotion of sustainable livelihoods and enhanced nutritional and socioeconomic conditions. It is also important to find ways of improving fishery marketing for both local and international markets. In this respect, attention should be paid to

sanitary and phytosanitary conditions so that Sierra Leonean fishery products can qualify for all markets in the world.

The same applies for the livestock subsector. Trade data show high imports of animal products, implying that there is a huge demand for such commodities. Local production, however, does not seem to be sufficient to satisfy local demand. It is therefore important to encourage and promote the production of these livestock products locally, as there is a ready market available to absorb the commodities that will be produced. In addition, livestock products (such as poultry and pigs) in which the country has a clear advantage, as well as human resources that can be quickly tapped to provide the required labor, could be used as an entry point.

Comparisons of the production growth rates of various agricultural commodities in Sierra Leone with those of other West African countries show that Sierra Leone has a comparative advantage in the production of root crops and high-value crops such as vegetables (mainly for domestic markets), fruits (mainly for domestic markets), plantain/banana, oil palm, sugar, and rubber (also for the domestic market) (Table 7). Rice, as the dominant annual crop, has huge potential for both domestic production and export (rainfed rice). Sorghum and millet, although used mainly for domestic consumption, have export potential in the West African subregion.

The agricultural sector also has good prospects for using cassava production to boost agricultural productivity and raise the incomes of farmers. A 2006 International Food Policy Research Institute (IFPRI) study shows that for root crops and other high-value crops, the production growth rate (1998–2004) is higher in Sierra Leone, as compared to the West African coastal region average (Table 7). This implies that such crops could be used as priority commodities for boosting agricultural growth.

Table 9. Production growth rate employed in the base run – coastal region (based on the trends of 1998–2004)

Countries	Cereals	Roots	Pulses & oilseeds	Cotton & cocoa	Other high-value crops	Livestock
Guinea	2.20	3.44	3.83	2.63	2.32	4.52
Sierra Leone	1.72	3.61	3.36	2.51	5.68	2.07
Côte d'Ivoire	1.57	2.55	3.27	2.67	3.12	2.18
Ghana	2.85	3.66	3.06	3.39	4.31	3.58
Togo	2.89	2.81	4.10	3.09	2.88	2.50
Benin	3.15	3.02	3.04	4.33	4.94	2.73
Nigeria	2.78	3.50	2.75	3.35	2.62	3.09
Coastal average	2.45	3.23	3.34	3.14	3.70	2.95

Source: IFPRI (2006)

3. CIVIL WAR IN SIERRA LEONE

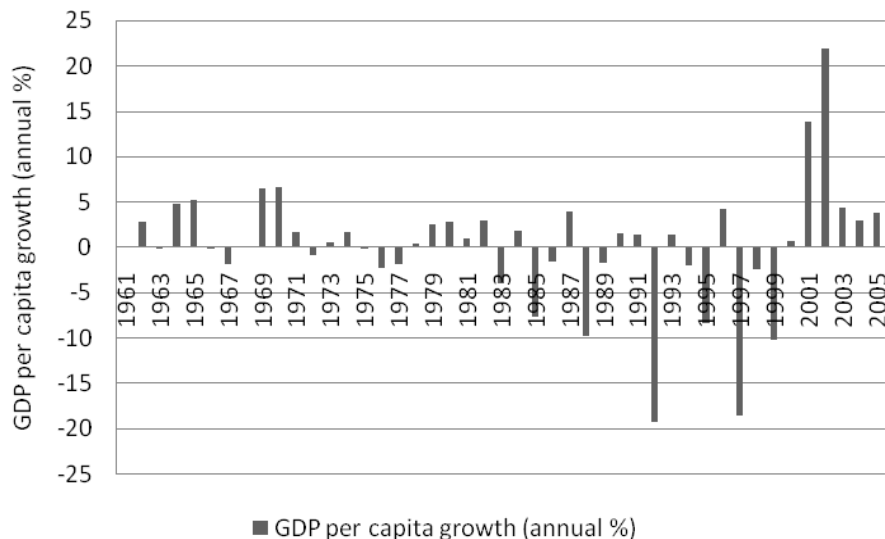
Sierra Leone faced a decade-long civil war, which began in 1991 and ended in 2001. A mix of political, social, and economic factors within Sierra Leone caused the war. However, the root cause was bad governance. The symptoms of the war were widespread poverty, unemployment, low productivity and production in all sectors, and inequity in access to the nation's resources, which led to the pervasive disenchantment of Sierra Leoneans.

Devastation by the Civil War

During the civil war in the 1990s, the economy of Sierra Leone was volatile and, on average, contracted at a rate of 3.5 percent per annum (Figure 3). GDP per capita growth declined from 1.4 percent in 1991 to negative 19.2 percent in 1992 (World Bank 2007). Per capita income plummeted by 47 percent, leading to an exacerbation of poverty, especially in rural areas. In evaluating the impact of civil war on growth performance across West African countries, there is a striking difference between the performances of countries that have experienced relatively little or no conflict compared to those countries that have experienced severe wars (Table A.3). Sierra Leone falls into the category of countries with a severe war and slow recovery, which resulted in negative GDP per capita growth.

The agricultural sector, which employs 70 percent of the population and contributes about 51.9 percent of GDP, registered a reduction in income. Farm families fled rural areas, abandoning their household belongings and productive assets, including land and livestock. The effect of the war is evident in the diminished livestock numbers, as described in section 2.1.5.

Figure 3. Sierra Leone annual GDP per capita growth (percentage) (1961–2005)



Source: World Bank (2007)

Just before the war, Sierra Leone had a poverty rate of 29.8 percent, as compared with 69.6 percent for its neighbor, Guinea. The civil war had a dramatic impact on poverty in Sierra Leone. The poverty situation deteriorated during the war, and by the year 2000 Sierra Leone had one of the highest poverty rates in West Africa, at 71.8 percent, compared with an average of 57.8 percent for the West African subregion (Table 8).

The National Nutritional Survey of 1990 indicated a high prevalence of malnutrition in Sierra Leone even prior to the civil war. Thirty-five percent of children were stunted, about 8 percent were wasted, and 27–29 percent were underweight. A decade later, in 2000, towards the end of the war, wasting had increased to 10 percent, with 27 percent of children being underweight, while stunting remained at 35 percent. The increase in wasting (which points to short-term food insecurity) from 1990 to 2000 can be attributed to the civil war. However, because the war was fought mostly in the provincial states instead of in the capital, Freetown, about 75 percent of the population in the provincial states was reported to lack access to adequate amounts of food, as compared to 38 percent in Freetown.

Table 10. Poverty rates in West Africa

Countries	Dollar-a-Day Poverty Rate (%)		Actual Annual Change, 1990– 2000 (%)
	1990	2000**	
Sierra Leone	29.8	71.8	9.2
Guinea-Bissau	53.4	84.2	4.7
Central African Republic	51.7	81.5	4.7
Togo	57.5	63.3	1.0
Mali	65.2	71.7	1.0
Niger	70.8	74.5	0.5
Côte d'Ivoire ²	32.3	33.6	0.4
Chad	80.8	81.8	0.1
Senegal	57.9	53.9	-0.7
Nigeria	72.8	67.6	-0.7
Guinea	69.6	64.0	-0.8
Burkina Faso	44.5	40.5	-0.9
Mauritania	56.6	50.5	-1.1
Congo, Rep.	59.1	52.0	-1.3
Benin*	34.9	30.7	-1.3
Gambia	45.7	37.8	-1.9
Ghana*	52.0	40.0	-2.6
Cameroon*	53.3	40.2	-2.8
East Africa	59.4	61.4	0.3
Southern Africa	43.8	42.9	-0.2
West Africa	54.9	57.8	0.5
Sub-Saharan Africa	44.5	46.4	0.4

Source: UNIDO (2004), as cited in IFPRI (2006)

*Based on national poverty line.

**Years for 2000 vary between 1998 and 2001.

Food security has been a problem in Sierra Leone. The Global Hunger Index (GHI) for 1990 and 2008 shows a slight improvement, of only 0.2, for Sierra Leone, compared to an almost one-fifth improvement for the index at the global level and an 11 percent improvement over the period for SSA. The country was 84th among 88 countries for which the GHI was computed in 2008, beating only Niger, Burundi, Eritrea, and the Democratic Republic of Congo. These countries' hunger status is worrisome. Von Grebmer et al. (2008) identify war and violent conflict as the major causes of widespread poverty and food insecurity in most of the countries with high (unfavorable) GHI scores.

National Rehabilitation after the Civil War

The cessation of hostilities in 2001 brought about an improvement in Sierra Leone's security situation and paved the way for economic reconstruction. Output growth rose from 3.8 percent in

2000 to 5.4 percent in 2001 and 6.3 percent in 2002 (MAFFS 2004). This reflected the continuing recovery of agriculture and the expansion of activities in the manufacturing, construction, and services sectors. The GDP growth rate has improved further, with 7.2 percent and 7.5 percent growth in the years 2006 and 2007, respectively. In 2008, GDP was projected to grow by 6.5 percent.

The government of Sierra Leone concentrated its efforts on the resettlement of persons displaced by the war in their original communities by providing planting materials, livestock, and microcredit schemes (especially for women farmers). In collaboration with donors, an interim poverty reduction strategy paper was developed in 2001 to show the government's commitment and road map. In addition, an Agricultural Sector Review and Strategy for Development was developed in 2004 to supplement the poverty reduction strategy paper.

The previous government's overarching policy objective for the agriculture sector was to improve the agricultural output and incomes of small-scale farmers, reduce poverty, and achieve food security in the medium term, while maintaining the productive capacity of the country's natural resources (MAFFS 2004). Its strategy for meeting the objective was the empowerment of small-scale farmers and the creation of an environment in which commercial agriculture could thrive, through the development of rural infrastructure, the facilitation of access to credit, input and output marketing, the intensification of farming, and increasing labor productivity.

The newly elected government (2007) also recognized the need to reduce poverty and attain food security but put more emphasis than before on the commercialization of agriculture, agricultural mechanization, irrigation, and boosting private sector participation in agriculture and making agriculture the engine for national economic growth. MAFFS is implementing a number of projects focusing on the rehabilitation and development of the agricultural sector. One of them, the Agricultural Sector Rehabilitation Project, has particular relevance to the rehabilitation of the Rice Research Station (RRS) and the Institute of Agricultural Research (IAR). The goal of the project is to contribute to increasing sustainable agricultural production in order to achieve national food security and poverty reduction as part of the government's overall rehabilitation and recovery program. The components of the project are as follows:

1. Agricultural production support: rehabilitation of lowlands, rehabilitation of tree crop plantations, and production of seeds and planting materials
2. Capacity building of MAFFS and rural communities: rehabilitation or reconstruction of MAFFS and related field offices, strengthening of extension services, rehabilitation of rural infrastructure, and improvement of commercial infrastructure and training
3. Project coordination and management

As part of component 1, the RRS will produce rice foundation seed, which will be distributed to growers and seed producers for the multiplication of certified seeds. In order to achieve this, relevant facilities (houses, offices, seed laboratories, swamps) at the RRS, in Rokupr, and three outstations will be rehabilitated and provided with farm equipment. Bunds, ditches, drains, and control and access structures will be repaired or built.

For the other food crops, the project will support the rehabilitation of buildings at the IAR, in Njala, and two outstations. Seed-planting-materials producers and enterprises will be promoted by organizing farmers and providing them with improved varieties of cassava, sweet potato, yam, cowpea, soybean, and maize as well as technical advice.

4. AGRICULTURAL RESEARCH IN SIERRA LEONE

Sierra Leone has had a long history of agricultural research, spanning almost 100 years. Agronomic research was performed at the Njala Experiment Station, Southern Province, which was opened in 1910. The RRS, which was established at Rokupr, Northern Province, in 1934, was devoted to research on mangrove and swamp rice (Malton, Randolph, and Guei 1998). In 1953, the station was transformed into the West African Rice Research Institute. In the 1960s, the research station advanced into breeding new seed varieties, with a concentration on varietal development for the lowland ecology (Dalton and Guei 2003).

A veterinary station was set up at Teko, Kabala, in 1942, and a livestock station at Musaia in 1943, both in Northern Province. In 1953, the oil palm research program at Njala became the West African Institute for Oil Palm Research. From 1953, forestry research was carried out at the Forestry Research Station at Bambawo, Eastern Province, and high-yielding Amazonian cocoa planting materials were propagated and distributed from Kpaubu. From 1953, fisheries research was conducted at the West African Fisheries Research Institute at Kissy, near Freetown.

The interesting developments in the historical account of agricultural research in Sierra Leone are the distribution of research facilities among the various provinces of the country and the number of subregional research centers established throughout the country. This allowed research to be conducted on a large number of commodities in the various agro-ecological zones of the country.

To be able to coordinate research and harmonize activities for the benefit of farmers and fishermen, the National Agricultural Research Coordinating Council (NARCC) was established in 1985. The vision of NARCC was to “become an institution of excellence in the management of agricultural research and the generation and dissemination of appropriate agricultural technologies in collaboration with partners and clients.” Its mission was to “contribute to poverty alleviation and food security in Sierra Leone through research and development activities aimed at increasing the productivity, profitability and utilization of food and cash crops in ways that conserve the natural resource base.” The mission was in support of Pillar II (promoting pro-poor sustainable growth for food security and job creation) of Sierra Leone’s poverty reduction strategy paper. NARCC’s mandate was confined to annual crops.

The two constituent institutes of NARCC were the Rice Research Institute, dealing with rice, millet, sorghum, banana, plantain, and vegetables, and the IAR, dealing with cassava, sweet potato, yam, maize, cowpea, groundnut, soybean, and sesame. The earlier research institutes ceased to exist. In addition to the research institutes, Njala University and the University of Sierra Leone carry out agricultural research.

Impact of the Civil War on Agricultural Research

The promising agricultural research system of Sierra Leone was devastated during the civil war. Rebels of the Revolutionary United Front (RUF) and soldiers of the Armed Forces Revolutionary Council (AFRC) entered the premises of the IAR and the RRS and caused considerable damage to the physical structure, especially those of the RRS. Looting by the Rokupr community continued after the rebels fled the area.

Vandalization of buildings and looting of fixtures, furnishings, and equipment was common at the RRS. Some buildings took direct rocket hits; roofing, electrical fittings, and water closets were removed from staff houses and administrative buildings; and furniture was carted away. Research facilities and expensive equipment such as a newly acquired spectrophotometer and a liquid scintillating counter donated by the International Atomic Energy Agency were destroyed. So too were screen houses, the hybridization unit, and meteorological equipment.

The seed store / cold room was damaged, resulting in loss of rice and sorghum germ plasm and numerous advanced breeding lines. The 150-kilovolt electricity generator, property of the National Power Authority, and two 20-kilovolt standby generators, belonging to the RRS, were damaged, as were transmission lines. Swamps for lowland rice research and the production of breeder and foundation seeds were abandoned as a result of the war. Abandonment led to the deterioration of the facilities.

The information available on the effects of the civil war on the human resources of the agricultural research stations is anecdotal, as surveys were not performed. It is, however, sufficient to say that many well-trained Sierra Leonean scientists, including researchers from the university and the research institutes, fled their campuses and took refuge in Freetown or left the country. Those who left Sierra Leone went to Guinea, Gambia, Ghana, Togo, Côte d'Ivoire, and other West African countries. Some went as far as the United States and United Kingdom.

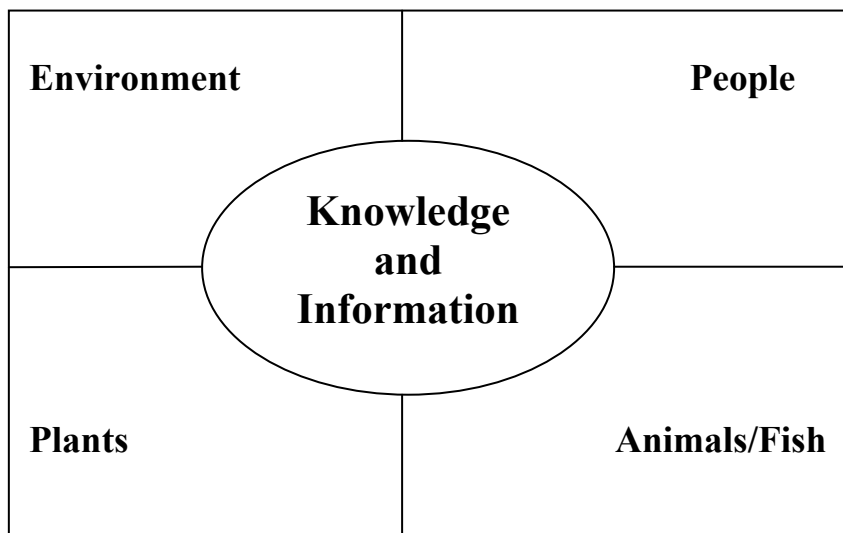
During the war, some shocking events happened to the research system and the enlightened population of the nation. The first director of the IAR, Prof. M.T. Dahniya, and his wife were shot dead by rebels in the outskirts of Freetown. His research coordinator, Prof. J.B. George, had earlier suffered a stroke as a possible consequence of the trauma of the seizure of IAR vehicles by AFRC forces and other stressful events; he subsequently died.

The good news is that most researchers returned after the end of the war. Hence, the negative effect of the war was mainly a loss of research outputs, infrastructure, and the capacity to generate new knowledge and improved agricultural technology rather than a reduction in the number of researchers per se.

Rehabilitating Agricultural Research after the Civil War

The new paradigm for agricultural development calls for a systems approach in which the environment, agricultural activities, and people are integrated and fed by knowledge and information (Figure 4). Agricultural research therefore plays a major role in facilitating this bond and coexistence by providing the knowledge and information needed for innovations that will lead to a sustained increase in agricultural productivity and production.

Figure 4. The new paradigm for agricultural development



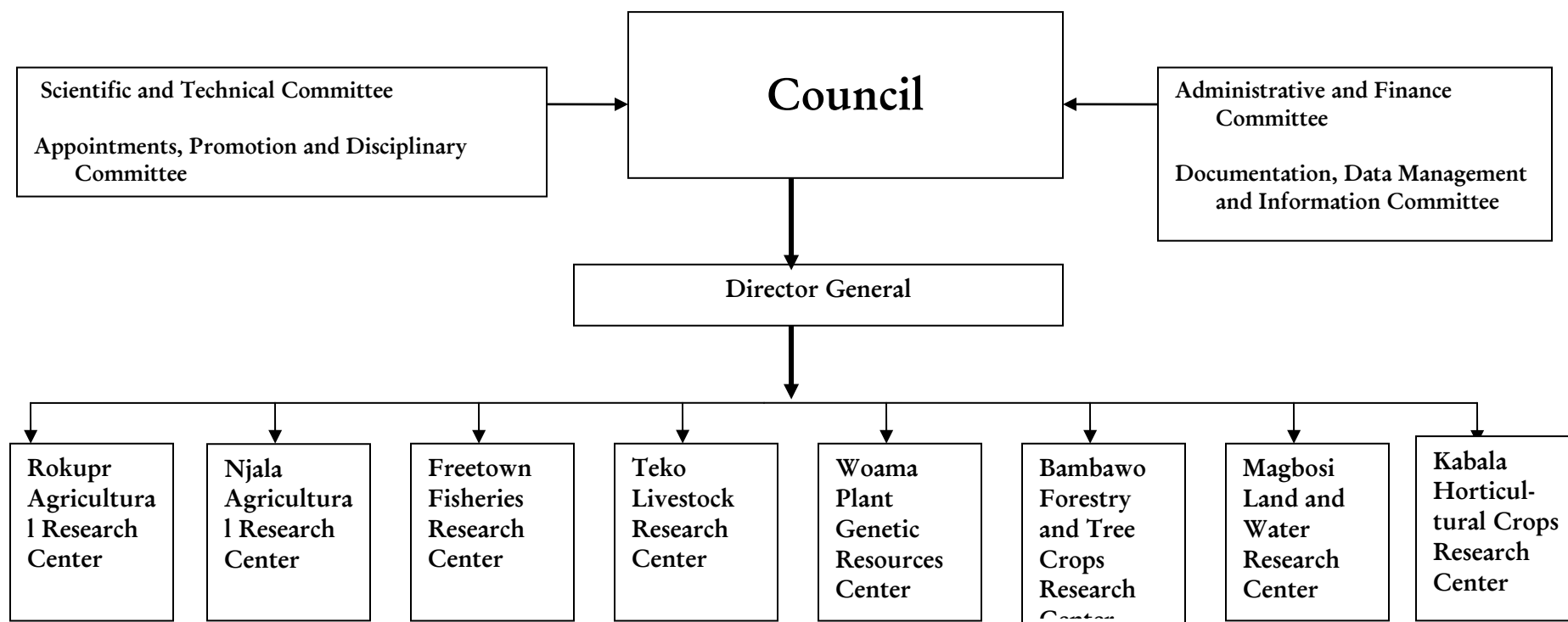
After a period in which agricultural research in Sierra Leone was coordinated under the NARCC, the parliament of Sierra Leone passed the Sierra Leone Agricultural Research Institute (SLARI) Act in 2007 and received the assent of the president on September 18, 2007. SLARI was made the agricultural research and agricultural technology generating body for the benefit of the farming, fishing, and forestry sectors in Sierra Leone; it would also provide for other related matters.

According to the SLARI Act (Government of Sierra Leone 2007), SLARI will have the following eight research centers when fully operational:

- Rokupr Agricultural Research Center
- Njala Agricultural Research Center
- Freetown Fisheries Research Center
- Teko Livestock Research Center
- Woama Plant Genetic Resources Center
- Kenema Forestry and Tree Crop Research Center
- Magbosi Land and Water Research Center
- Kabala Horticultural Research Center

SLARI is governed by a council. The chief executive is a director general who reports to the council. To assist in its work, the council has four committees that report to it: the Scientific and Technical Committee; the Appointments, Promotion and Disciplinary Committee; the Administrative and Finance Committee; and the Documentation, Data Management and Information Committee (Figure 5).

Figure 5. Organogram of Sierra Leone Agricultural Research Institute (SLARI)



The functions of SLARI were defined under the SLARI Act of 2007, which states that “the object for which the Institute is established is to serve as the government agricultural research and agricultural technology generating body in Sierra Leone with powers to participate in agriculture technology transfer activities.” The core functions of SLARI can be summarized as agricultural research, information and knowledge dissemination, capacity strengthening, and advocacy (Table 9).

Table 11. Summary of core functions of SLARI

Core Function	Function Defined in the SLARI Act⁴
1. Agricultural Research	<ul style="list-style-type: none"> [b] Formulate agricultural research policies and programs in the context of national agricultural policies, poverty alleviation, food security, and improved livelihoods [c] Conduct broad-based research on food and cash crops, livestock, fish, land and water management, forestry production and conservation, technology and socioeconomics of postharvest production, emerging technologies in agricultural science, biosafety, and the environment [l] Monitor and evaluate the adoption and impact of agricultural research on productivity
2. Information and Knowledge Dissemination	<ul style="list-style-type: none"> [a] Provide information to assist policymakers/stakeholders in formulating appropriate agricultural policies [e] Maintain registers of research scientists, projects, and results [g] Produce annual reports highlighting the management, scientific, training, and financial aspects of SLARI
3. Capacity Strengthening	<ul style="list-style-type: none"> [k] Disseminate knowledge on improved technologies to stakeholders [d] Establish strong working relationships with extension agencies in the private and public sectors for transfer of technologies [f] Facilitate and provide relevant training and human resource development to support the agricultural research needs of the country
4. Advocacy	<ul style="list-style-type: none"> [h] Establish strong links with national, regional, and international research institutions involved in science and technology [m] Process and forward to the government annual estimates for funding [i] Represent the country in regional and international agricultural research forums [j] Enhance public awareness of the importance of scientific research to agricultural and economic development [n] Mobilize human, financial, and capital resources from donors, the private sector, and within the institute for the benefit of SLARI

Source: SLARI (2007b)

⁴ These have been slightly edited for the purposes of displaying in the table. The letter in brackets refers to the paragraph in Section 20 (2) of the SLARI Act.

5. REORGANIZATION OF AGRICULTURAL RESEARCH IN SLARI

The agricultural research of Sierra Leone is driven by the umbrella organization SLARI. Therefore, the success of agricultural research depends on the vision of SLARI and the results it delivers. As a new organization, SLARI must make some strategic decisions to guide its operations in order to make it effective in responding to the expectations of its stakeholders. In this respect, a strategic plan was developed in a consultative way to guide SLARI in the pursuit of its mission.

Development of SLARI's Strategic Plan

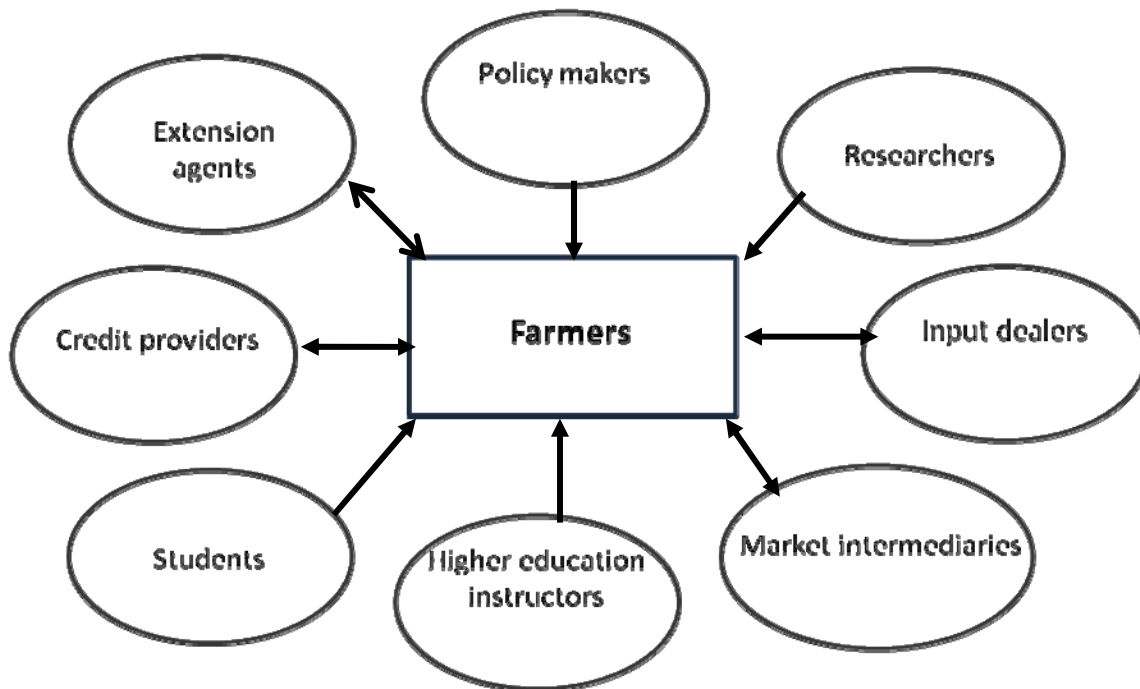
Conceptual Framework: Integrated Agricultural Research for Development (IAR4D)

The strategic plan of SLARI was developed within the conceptual framework of Integrated Agricultural Research for Development (IAR4D). The IAR4D framework entails the active involvement of diverse actors in the value chain, with farmers placed at the center of innovation practices (NEPAD 2002; FARA 2004). The diverse actors who interact with farmers include policymakers, researchers, input dealers, market intermediaries, higher education instructors, students, credit providers, and extension agents (Figure 6).

Under IAR4D, various actors interact to create the necessary collaborative synergy to achieve impact at the grassroots level. The IAR4D system requires linking research to development objectives, implying the need to maintain coherence among short-term project objectives and longer-term development objectives and to ensure synergy among related projects at a point in time.

Unlike the concept of IAR4D, almost all African national agricultural research systems (NARS) tend to be narrowly focused, following basically the linear innovation model of the research-extension-farmer approach. The original structural features of NARS in Africa were established by colonial governments that were often concentrating on the production of export crops for use as “raw materials” by European industries (Lynam and Elliot 2004; Mbabu and Ochieng 2006).

Figure 6. Integrated Agricultural Research for Development (IAR4D)

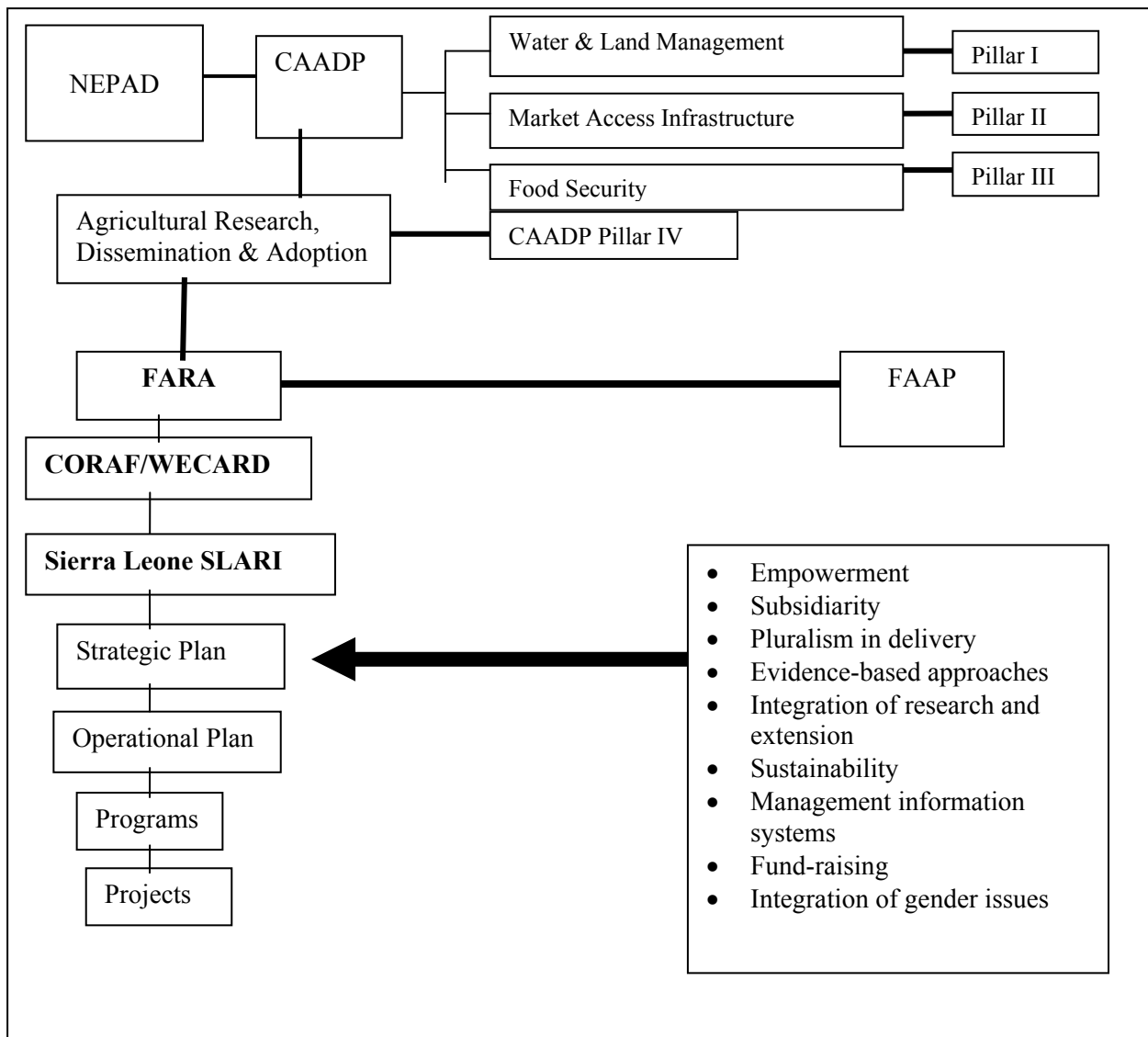


After independence, the NARS were adjusted to include the integration of smallholder farmers into commercial agriculture and to address the needs of subsistence farmers (Mbabu and Ochieng 2006). Currently, many NARS in Africa are struggling to shift smallholder farmers to become much more integrated and agroindustrially oriented. This shift implies the need for NARS to follow the Agricultural Innovation Systems approach by reorganizing the current agricultural research systems to operate in cognizance of other actors in the agricultural value chain so that they can achieve greater impact.

The IAR4D approach uses a basket of options and mechanisms that combine participatory methodologies with a holistic view of the agricultural system, people, and the location of research within the system. The paradigm encourages learning through the interchange of ideas and experiences by diverse actors, with a focus on putting farmers and end users at the center of research.

The IAR4D framework encourages the creation of synergy among different research organizations at the national, subregional, and regional level. Developing a strategic plan that ensures such synergy calls for the use of a hierarchical logical framework (logframe) whereby one or more goals are nested within other goals. The use of the logframe allows the strategic plans at the regional, subregional, and national levels to nest within each other (Figure 7).

Figure 7. Hierarchical nesting of SLARI Strategic Plan



Methodology for Strategic Plan Development

The key strategic questions are the following:

- Can all or some of the functions of SLARI be effectively carried out by another organization?
- What kind of future will the choices, actions, or inaction of SLARI define?
- Is SLARI anticipating market needs and creating new ones (properly defining the sector)?

The strategic plan of SLARI was developed in the logframe format in the context of the IAR4D paradigm. The strategy was developed using onion-skin nesting, which permitted a hierarchy of activities to relate directly to each other. This way, the strategy became coherent with the CAADP primary goal and the principles and guidelines encapsulated in the FAAP

(Figure 5). This provided consistency not only with regional concerns expressed in the Forum for Agricultural Research in Africa (FARA) strategic plan, but also with those of the subregion, through alignment with the Conseil Ouest et Center Africain pour la Recherche et le Développement Agricoles (CORAF) / West and Central African Council for Agricultural Research and Development (WECARD). In addition, it provided a basis for members of the whole NARS to plan, and to ensure that their plans and efforts would also contribute to the wider goals. Therefore, the SLARI strategic plan is about innovation—to enable SLARI to anticipate the future and prepare for it. The methodology used is based on an understanding of the dynamics of SLARI over a specified period of time.

The strategic plan addresses prioritized issues and makes a clear commitment to delivering a series of results that encompass a new paradigm for agricultural research and development. This approach covers not only conventional research but also the use of innovation platforms, policy, markets, capacity strengthening, coordination, advocacy, knowledge management, and the involvement of a broad base of stakeholders. All this is integrated in an approach that considers not only research but also development, that is, the IAR4D framework.

The SLARI strategic plan was developed in a consultative way at a stakeholder workshop with 61 stakeholders representing the staff of SLARI; MAFFS; the Ministry of Fisheries and Marine Resources; the Ministry of Lands, Country Planning and the Environment; NGOs; farmer organizations; tertiary institutions and development partners; two resource persons from IFPRI; and a facilitator. The five-day strategic planning workshop discussed the following items in plenary and group sessions to obtain consensus on the issues:

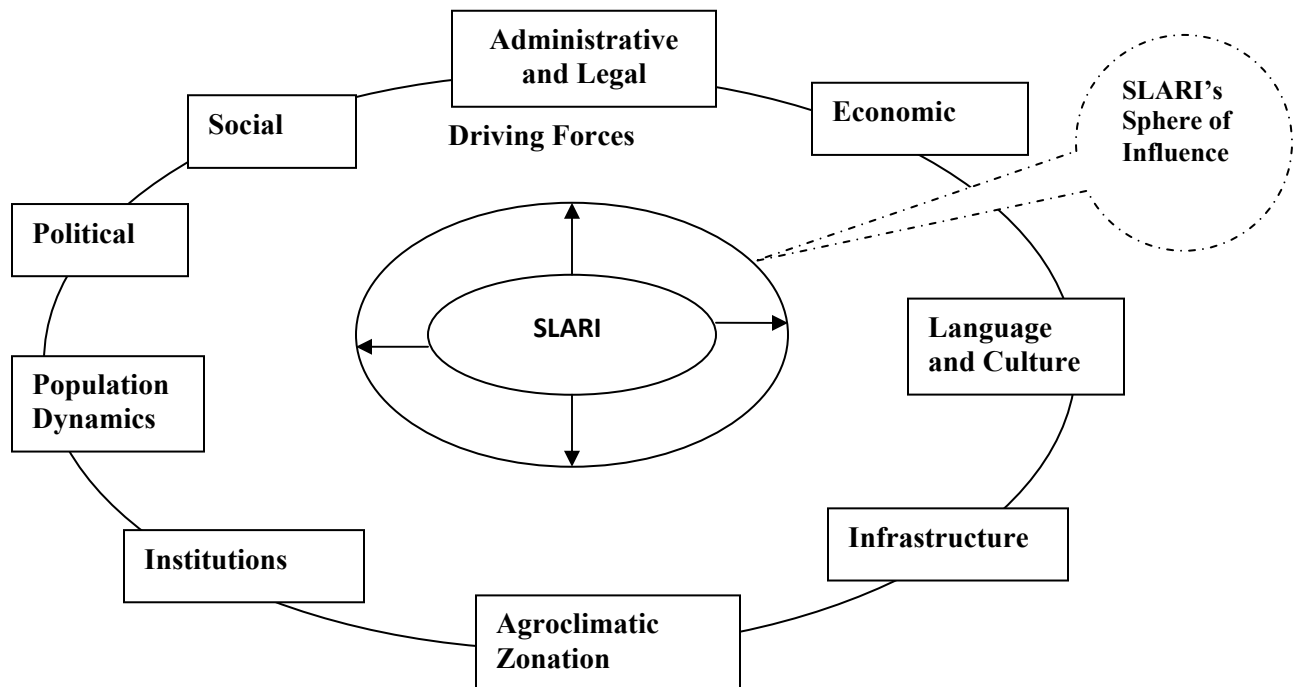
1. Strategic planning as a management tool
2. Policy context
3. Stakeholder analysis
4. SWOT (strengths, weaknesses, opportunities, and threats) analysis
5. Logframe and nesting of plans
6. Development of general objectives and specific objectives, and vision and mission statements
7. Development of activities
8. Development of assumptions
9. Development of indicators

In addition to the workshop, several documents on the economy, demography, agriculture, and research in Sierra Leone were reviewed, and they provided pertinent information to complement contributions from workshop participants.

SWOT Analysis

An important input in developing a strategic plan is undertaking a SWOT analysis. Various actors, both internal and external, affect the performance of SLARI as a research organization. SLARI has control over the internal factors, which can be its strengths and/or its weaknesses and can give an indication of the readiness, capabilities, and uniqueness to carry out its functions as an agricultural research institute in Sierra Leone. External factors can be opportunities for and threats to SLARI; it has no or very little control over these factors, but still they can affect its viability as a research institute (Figure 8).

Figure 8. Forces of influence on SLARI – internal and external environment



SLARI's sphere of influence is limited to internal factors, that is, its strengths and weaknesses, as denoted by the four arrows within the second inner circle of Figure 8. The outer large circle shows the external environment, that is, opportunities and threats that SLARI has no or little influence on, as shown in the boxes.

Before proceeding into setting the strategy, a SWOT analysis was carried out. It was important to identify the strengths, weaknesses, opportunities, and threats so that SLARI could make use of its strengths and opportunities and find a way of dealing with the weaknesses and threats so that they do not impact negatively on its operations. As Table 10 shows, SLARI's strengths are related to its collaboration with university, national, and international research centers, which enables innovative research through these linkages; political support; and the existence of a well-constituted governing council. These strengths enhance the efficiency of SLARI's activities.

The weaknesses of SLARI include the shortage and poor management of resources (including skilled human resources), poor infrastructure, and weak channels of communication both within SLARI and among farmers, extension workers, and researchers. SLARI's opportunities can be summarized as improved access to donor support for being a new organization, access to rich natural resources and a diverse genetic base, favorable legislation and policy environment at the national level, and membership in a wide range of regional and subregional agricultural organizations. The threats to SLARI include poor conditions of service, which may affect recruitment and staff retention; political instability; poor infrastructure; and limited funding and reliance on external funding.

Table 12. Results of SLARI SWOT analysis

Issues	Related Factors and Trends
Strengths	
1. Collaboration between university and research institutes	Collaboration already exists between Njala University and the IAR and RRS. The collaboration with SLARI is expected to strengthen.
2. Trained, qualified, and experienced research personnel	Social and economic stability will make many highly trained Sierra Leoneans return home.
3. Strong linkages with national and international research centers	Through CORAF/WECARD and FARA, SLARI will create linkages to other national research organizations. SLARI has good linkages with CGIAR centers such as IITA and WARDA and can explore partnerships with other centers, as started with IFPRI-ISNAR.
4. Well-constituted council	The council, with its Scientific and Technical Committee, will provide the guidance required to spearhead SLARI.
5. Innovative research through linkages	Linkages with national and international research organizations will lead to innovations in the organization and management of SLARI.
6. Strong learning institutions	Within the innovations system paradigm, SLARI should consider itself a learning organization.
7. Political support	The passage into law of the SLARI Act and the appointment of a chairman for the council are indications of political support.
8. Communication via annual reports and scientific publications	In the past, NARCC has produced annual activity reports. It is expected that this culture will continue with SLARI.
9. Language and culture	About 90 percent of the population speaks Krio, which facilitates communication among the various SLARI stakeholders.
Weaknesses	
1. Insufficient technicians	Without good technical support it will be difficult to carry out good research. This situation will continue until a training program is designed to bring more people into the area and improve conditions of service for them.
2. Poor infrastructure and limited research and training facilities	Poor infrastructure (energy, roads, pipe-borne water) and poor laboratory and information and communication technology facilities limit the conduct of research. Absence of local training facilities imply that people must be sent away, and the prohibitive costs of such training make it an unsustainable option.
3. Inadequate resources and mobility	Research requires equipment and vehicles to move from one place to another. This will continue to be a limitation for SLARI in conducting participatory client-driven research.
4. Gender inequality	The proportion of female scientists is extremely low in a country where women play a major role in farming.

Table 13. Results of SLARI SWOT analysis (continued)

Issues	Related Factors and Trends
5. Weak database management skills	Biometricians and information technology specialists should be employed; otherwise, (1) SLARI staff will have problems with analytical work, and that will slow down the publication of their work and therefore professional progression, and (2) SLARI managers will not have ready access to various types of information.
6. Inadequate channels of communication	The absence of a SLARI publication series frustrates the publication plans of staff. These issues must be addressed by starting a SLARI technical and discussion paper series or by teaming up with the universities to start a journal or similar publication.
7. Weak research-extension-farmer linkages	The linkages must be strong in an innovation system. Researchers tend to work in isolation and do not interact with others in the innovation system. Often, research performed does not relate to real problems farmers face, and the results are not well disseminated for adoption.
8. Limited lobbying and advocacy capabilities	Scientists consider themselves experts in their fields and may not want to mingle with others. As a result, many people outside research organizations do not see the use of research. Resources are withheld from the organizations. Lobbying and advocacy skills must be cultivated so that the importance of SLARI will be felt in the society.
9. Poor management of resources	Organizational management and research management should be inculcated in the managers and project or program leaders.
10. Inability to attract highly qualified staff	Equating the salaries of research staff to those of the universities may not be enough. It may be necessary to look at conditions of service in the private sector. In addition to salaries, the researchers should have resources for research—research funds and computers to work with.
Opportunities	
1. Clean slate as a new body	The SLARI Act of 2007 and the appointment of a chairman for the council offer hope for a new start.
2. Improved access to donor support	With the end of the war, the donor landscape has improved for Sierra Leone, and SLARI can benefit from that.
3. Employment opportunities	New research centers to be established will offer new employment to scientists and their support staff. The Sierra Leonean economy is improving, and this will open up employment opportunities. The increased integration of the West African subregion will promote increased labor mobility.

Table 14. Results of SLARI SWOT analysis (continued)

Issues	Related Factors and Trends
4. Rich natural resources and a diverse genetic base	The different agro-ecological zones offer opportunities for research.
5. Expansion into other areas of research	The SLARI Act provides for the establishment of six additional research centers. This will enable new areas to be explored.
6. Favorable legislation and policy environment	The end of the war and the return to democracy, as has been demonstrated in a successful change of government, affirms a positive legislation and policy environment.
7. Sharing of staff with the university	This is already happening with Njala University. More cooperation with the universities is foreseen.
8. Collaboration with NGOs, councils, private sectors, and communities	The favorable political environment will promote a positive environment for the private sector, NGOs, and so on, and SLARI will benefit from it. This is a requirement for integrated agricultural research for development.
9. Membership in a wide range of regional and subregional agricultural organizations	As a member of CORAF/WECARD, FARA, and other organizations, SLARI can share ideas and have access to more resources for its work.
10. CAADP	The Framework for African Agricultural Productivity (FAAP) and the proposition to invest 10 percent of the budget in agriculture will promote agricultural growth and development.
11. Wide range of activities to influence economic growth	With more research centers and increased research activity, SLARI can bring out more relevant research results that can influence policy and economic growth.
12. Increased collaboration with international research centers	The favorable political climate is bringing the international research community back to Sierra Leone.
13. Improved local and external linkages	The improved political climate has brought hope to many Sierra Leoneans and a desire to assist from outsiders.
14. Improved consultations, workshops, and field days	The improved political situation has also improved Sierra Leone as a venue for international meetings and activities. In the countryside, farmers can freely participate in farmer field schools and other activities.
15. Pool of experienced, retired research personnel	Due to its long history of education, Sierra Leone has a large pool of highly educated and experienced citizens in the diaspora. These people are beginning to return home now that there is peace in the country.
16. Staff training linkages	The existence of many training centers in the subregion and elsewhere and the desire to assist Sierra Leone to succeed open doors for staff training.
Threats	
1. Poor conditions of service affecting recruitment and staff retention	This will be a disincentive for staff recruitment and retention. It will take some time before this can be rectified, as the reconstruction needs are enormous.

Table 15. Results of SLARI SWOT analysis (continued)

Issues	Related Factors and Trends
2. Weak extension services	This will hinder collaboration between SLARI and other stakeholders in the joint planning and implementation of agricultural research for development.
3. Limited funding and reliance on external funding	External funding cannot be assured, and so it is difficult to use it for planning.
4. Political interference in staff recruitment	The council should be given the power to make the major appointments in SLARI.
5. Political instability	The country is now relatively stable, but the possibility of instability in the future remains.
6. Red tape in funding procedures	As long as SLARI receives its funding from MAFFS, there will be some red tape in the allocation and release of funds. This will disturb scheduling of research activities, especially when funds are delayed.
7. Unfair competition for international funds	The rules for international funds are not spelled out clearly. Sometimes the procedures are not even transparent. Political influence and alliances may dictate the flow of funds instead of need.
8. Failure to meet national obligations to international organizations	If Sierra Leone is in arrears in meeting its international financial obligations, then this will affect its ability to access some of the benefits provided.
9. High rate of urbanization	Increased urbanization may affect the attraction and retention of staff in research centers based in rural areas.
10. Poor infrastructure (energy, roads, pipe-borne water)	The situation is currently bad, but the prospects for improvement in the short to medium term are good.

Source: NARCC (2008)

Note: For organization names, see the list of abbreviations at the beginning of the paper.

The SLARI Strategic Plan

SLARI decided to set the time frame of its current strategic plan at 10 years, beginning on June 1, 2008. This choice was driven by the fact that the CORAF/WECARD strategic plan was set at 10 years, and also six of the SLARI research centers are yet to be established.

The strategic plan comprises the vision statement, mission statement, general objectives, specific objectives, activities, and expected results of SLARI. SLARI makes a clear statement of its strategic intentions in its vision and mission statements. It addresses these more specifically through the logframe in the strategic plan, which links what it will make a significant contribution toward, in the form of its general objective, with what it intends to achieve (specific objective) through delivery of its results. This forms the basis of the logframe that underpins this strategic plan and those of the programs and projects of SLARI.

In its strategic plan, SLARI undertakes, provided certain assumptions hold, to make a significant contribution to national agricultural growth. It intends to do this by achieving broad-based, sustainable improvements in agricultural productivity, markets, and marketing through the delivery of technologies and innovations, policy options, capacity strengthening, improvements in

collaboration and coordination, and knowledge management appropriate to the demands and needs of a broad base of priority clients.

SLARI Vision Statement

Vision

Increasing food security and wealth by contributing to sustainable agricultural growth and an effective agricultural research system.

SLARI Mission Statement

Mission

Supporting agricultural growth through increasing productivity by the generation and promotion of innovative technology and empowerment of stakeholders.

General and Specific Objectives

The general objective of the SLARI strategic plan is “broad-based agricultural growth sustainably improved.” Agricultural growth must be broad based to cover all types of producers—smallholders and large commercial farmers, food crop farmers and cash crop farmers, annual crop farmers and tree crop farmers, livestock farmers and fisheries producers, and pastoralists and sedentary livestock farmers. If all types of farmers are covered, agricultural growth can reduce poverty and create wealth. The growth must be achieved sustainably to enable it to have a lasting effect on the livelihood of the people and create a positive impact on the general economy.

SLARI will contribute to this general objective through its specific objective of ensuring that “agricultural productivity, markets, and marketing are improved.” The beneficial effect of agricultural productivity can be obtained if farmers are linked to markets (domestic, regional, and international) and they receive remunerative prices through efficient marketing. It is when agriculture becomes profitable that farmers will adopt the technologies that will lead to the innovations needed to spur on agricultural development in Sierra Leone.

Activities

In partnership with stakeholders, SLARI activities will be based on

1. Understanding the nature of the problem or results requirements,
2. Development or generation of appropriate interventions, and
3. Packaging or developing for promotion and uptake.

Expected Results

SLARI will deliver the following five key results:

1. Appropriate technologies and innovations generated and promoted
2. Appropriate policy recommendations developed and promoted
3. National capacity for research and technology development strengthened

4. Collaboration and coordination between stakeholders strengthened
5. Knowledge and information management systems established and operationalized

These results are in consonance with the knowledge generation function of SLARI as a research institute, as it investigates problems and releases new findings; manages the knowledge generated at the institute and elsewhere to form a knowledge base that will be promoted and shared with others for organizational, institutional, technological, and policy innovations in agriculture; strengthens capacity for improving research and development for agricultural development; and achieves synergy and harmony among different stakeholders. Some of the possible indicators that will be needed to monitor the achievement of the results are summarized in the logframe in Table A.4.

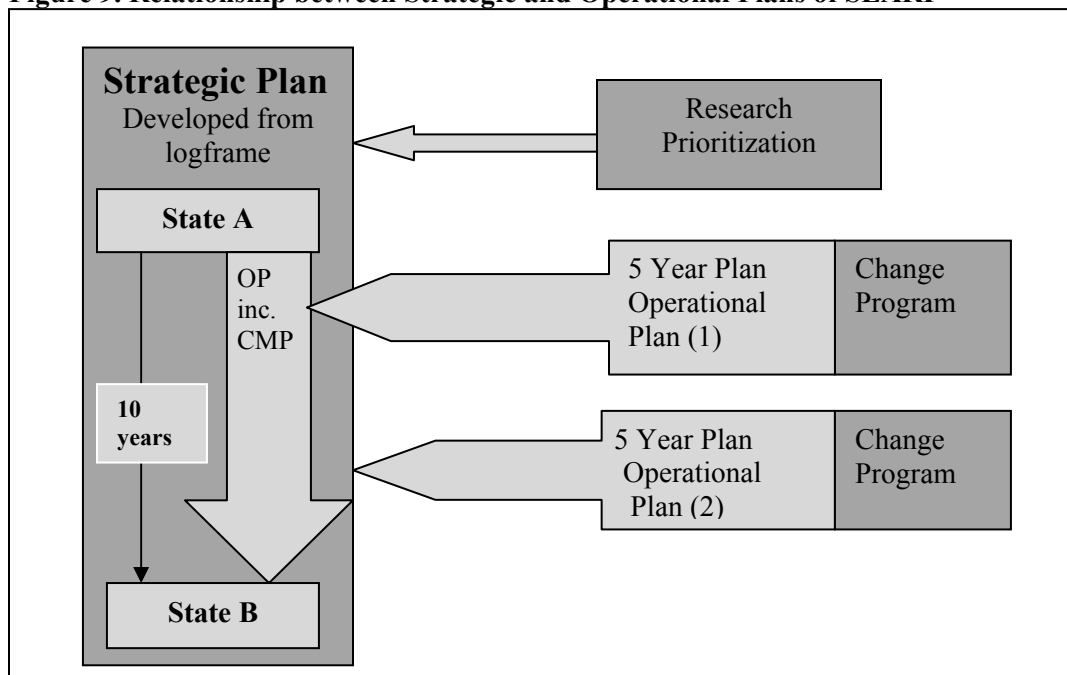
Development of SLARI's Operational Plan

The SLARI strategic plan has a long-term orientation of 10 years, which indicates where SLARI would like to be at the end of the period. To be able to move toward the target, it is important to have short- to medium-term operational plans. A 5-year operational plan was developed to implement the SLARI strategic plan (Figure 9).

Methodology for Operational Plan Development

The principle of subsidiarity, in which resources are assigned to each level consistent with the authority delegated to it, was applied. At the same time, decision making and responsibility are raised to the highest level at which spillover effects and benefits can be achieved. Adherence to this principle allows SLARI to devolve authority to those best placed to deal with it and ensures a focus on functions that spill over to national decision domains, so that national organizations and partners benefit from decisions and actions at the national level.

Figure 9. Relationship between Strategic and Operational Plans of SLARI



Source: SLARI (2007a)

The aim is to increase stakeholder ownership and responsibility on the basis of comparative advantage (and/or collaborative advantage), improving efficiency and reducing costs. Consistent with this, the operational planning process was undertaken in a participatory way in a stakeholder workshop involving key stakeholders of SLARI.

The operational plan was developed using the logframe approach in a participatory manner (see Table A.5). It was linked directly to the strategic plan, differing only in the time frame for its activities and indicators. As a planning and management tool, it is governed by the principle of cause and effect and supports onion-skin nesting, which permits a hierarchy of activities to relate directly to each other. It presents targeted outcomes that SLARI plans to achieve in a given time frame if certain critical assumptions hold true.

The operational plan was designed in such a way that it closely follows the FAAP principles. SLARI is contributing to CAADP's highest-level objective of "general economic development, eradication of poverty and hunger, through sustainably improving broad-based agricultural productivity, competitiveness and markets," which in turn is being achieved through the delivery of:

- appropriate technologies
- improved policy and advocacy
- increased capacity among stakeholders
- stronger and better coordination and collaboration between SLARI and its partners
- meeting the demand for information and knowledge

These outputs are the deliverable results of SLARI's strategic plan and the operational plan. This was the first step in harmonizing the way in which agricultural research for development is addressed in Africa. Through coherence with CAADP, it is possible for all NARS, subregional organizations, and FARA, as the overarching forum for agricultural research, to work toward a single objective. This was the first time a national Operational and associated strategic plan have been deliberately designed on CAADP and FAAP principles, making them coherent with subregional and regional plans for agricultural research.

Basis for SLARI's Operational Plan

The operational plan is designed using the center approach, based on the establishment and/or rehabilitation of one cross-cutting and seven commodity or subsector research centers. These centers will be centrally coordinated to ensure collaboration and coherence in all nationally relevant agricultural research and development activities.

The operational plan covers implementation during the first five years of SLARI's strategic plan. Integrated within it is a change management program that will affect all the centers as well as the directorate, and ensure that as implementation proceeds, agricultural research and development are supported by the changes necessary for creating effective impact.

The SLARI Operational Plan

The operational plan provides detailed guidelines on how the eight centers will operate within the emerging research paradigm, and touches on policy and related socioeconomic research and technical research. The operational plan also outlines the capacity-strengthening requirements of the research centers, the need for knowledge management, the requirements for funding research, and the need for change and change management. The operational plan also describes research center mandates, status, and priorities. Finally, the plan discusses the organization and

governance of the agricultural research centers (ARCs) under SLARI. In what follows, each of the subsections of the operational plan is summarized (see Table A.5 for a summary of the operational plan logframe).

Center Focus of the Operational Plan

For the purpose of developing the operational plan, centers are divided into three categories, as shown in Table 11.

Category I Centers. Those that currently exist and that have buildings as well as equipment, staff, research programs, and funding (Njala ARC and Rokupr ARC). These will receive support to prioritize research, develop and implement work plans, and shift into the new research paradigm as fully active members of SLARI. Integration into SLARI will be facilitated and supported through the appointment or secondment of individuals to act as focal points for this process. These individuals will be closely aligned with the change management team and will receive support from them.

Table 16. Categorization of centers in SLARI

Center	Focus Research Commodities	Capacity of the Center
Category I		
Njala ARC	Cassava, groundnut, yam, maize, sweet potatoes	Building, equipment, staff, research programs, and funding available
Rokupr ARC	Rice, sorghum, maize, digitaria, pearl millet	Building, equipment, staff, research programs, and funding available
Category II		
Teko Livestock Research Center	Animal genetic resources, livestock breeds, livestock diseases, local feed resources, micro-livestock	Site with damaged buildings, little or no equipment, few staff, and an extremely small or nonexistent research program, with little or no direct funding
Magbisi Land and Water Research Center	Land development, water management, agricultural land survey, geo-information gathering	Site with damaged buildings, little or no equipment, few staff, and an extremely small or nonexistent research program, with little or no direct funding
Bambawo Forestry and Tree Research Center	Study on germ plasm, germination technology, botanical garden, seed technology and storage, provenance trials	Site with damaged buildings, little or no equipment, few staff, and an extremely small or nonexistent research program, with little or no direct funding
Category III		
Freetown Fisheries Research Center	Biological research, interdependence of fisheries and their ecosystem, conservation engineering approach, research on fisheries, information management research	Yet to establish physically, no permanent site, no staff, no resources, and no funding available
Woama Plant Genetic Center	Study on germ plasm, tissue culture technologies, multiplication and propagation, seed technology and storage, establishment of gene bank	Yet to establish physically, no permanent site, no staff, no resources, and no funding available
Kabala Horticulture Research Center	Banana and plantain, pineapple, vegetables, papaya	Yet to establish physically, no permanent site, no staff, no resources, and no funding available

Source: SLARI (2007a)

Category 2 Centers. Those that have a site on which there are damaged buildings with little or no equipment, few staff, and an extremely small or nonexistent research program, with little or no direct funding. These will receive support through the establishment of focal points with the same terms of reference as those for Category 1 centers, with the additional responsibility of developing and sourcing the necessary physical and human resources to establish the physical presence of the new centers. The focus in 2008 will be on establishing desk officers in the directorate for Teko Livestock Research Center, Magbosi Land and Water Research Center, and Bambawo Forestry and Tree Research Center.

Category 3 Centers. Those that have yet to be established physically with a permanent site, buildings, staff, and other resources, and that have no funding available to them. The centers will not initially be part of the process of center establishment, but will receive some support to organize and work toward the placement of focal points within 12 months of start-up.

New Research Paradigm

The new paradigm of the operational plan places great emphasis on IAR4D, or an innovation systems approach. This approach uses a basket of options and mechanisms that combine participatory methodologies with a holistic view of the agricultural system, people, and the location of research within it. The paradigm encourages learning through the interchange of ideas and experiences. Key program service and management roles and functions, as well as research responsibilities under the new paradigm, focus on putting farmers and end users at the center of research.

For the centers, technical research issues are related to expanding the involvement of nonconventional partners and stakeholders in the research process. The targeted clients of this operational plan include female-headed and disease-affected households, youths, and other vulnerable groups.

The emphasis of the technical research is on adaptive and applied research, to which is allocated at least 70 percent of all operational resources, with the focus on impact-oriented activities. Pre-operational plan research projects, which are ongoing, are being reviewed and assessed to consider their appropriateness under the new plan. Compatible projects are being integrated into the programs of the new centers where possible, and incompatible projects are being discontinued as promptly as feasible.

Basic, strategic, and more upstream research is planned only where there is a comparative advantage and clear rationale in relation to the strategic plan.

Policy and Related Socioeconomic Research

Policy and related socioeconomic research is a new commitment for SLARI and requires the development of capacity as well as a clear strategy that identifies the scale and the scope of possible interventions. This includes recognition of the importance of effective dialogue and relationships with policymakers to ensure that appropriate research meets demand. The focus of policy research is identifying, developing, and establishing policy-related partnerships that effectively address policy, trade, market, institutional, and socioeconomic issues. Policy and related socioeconomic research informs policymakers and enables them to make decisions based on relevant, factual information.

Technical Research

It is the responsibility of the technical research programs to play an interactive and supportive role in policy and related research, as policy, market, trade, institutional, and socioeconomic themes cut across all center mandates.

Effective Research Delivery

All the centers will have programs or projects under the operational plan that are concerned with effective research delivery. These will ensure that positive and constructive interchanges occur to support and foster experiential learning. Such interchanges are crucial to developing coherence in the centers' approach to the implementation of SLARI's strategy. These support functions are capacity strengthening, coordination, and knowledge management.

Together these create the enabling environment in which the NARS can grow, providing the mechanism for delivery of the results that have been identified as the necessary and sufficient conditions for SLARI to achieve the improved productivity and markets that will lead to broad-based growth in the agricultural sector and ultimately contribute to poverty reduction in Sierra Leone.

The IAR4D paradigm requires multistakeholder and multilevel engagement, which requires carefully managed coordination. Three of SLARI's functions defined by the SLARI Act specifically target initiatives for coordination and developing linkages and partnerships, which will minimize duplication of effort, optimize synergies, and support resource mobilization, enhancing the effectiveness of SLARI and ensuring the achievement of its objectives.

Capacity Strengthening

Under the operational plan, SLARI recognizes the need to develop a strategy drawing upon the findings of the recent review of the NARS commissioned by FARA, and specific national requirements. The nature of the support is nonconventional in the sense that it goes beyond formal training for research workers and the provision of physical resources. While there is still a place for these, the main thrust is on "empowering stakeholders to think, articulate and collaborate effectively" with each other to create a multiskilled cadre of motivated, capable people willing to work toward delivery and impact.

Knowledge Management

SLARI, as a generator of knowledge, must have a mechanism to accumulate the knowledge and disseminate it to farmers. This mechanism should cover a wide range of activities, including establishing an appropriate repository for knowledge, advocacy, coordination of effort, and experiential learning. Knowledge management for SLARI addresses key CAADP targets for improving technology dissemination and information flows, and plays an important role in the delivery of each of SLARI's own expected results.

Programs at all the centers respond to, and deliver on, the knowledge management needs covered by guidelines in the Knowledge Management Program strategy, supported and enhanced through coordination by the center directors under the oversight of the directorate.

Funding of Research

Research will be funded through budget allocations made by the council on the recommendation of its Scientific and Technical Committee. Criteria for funding will be based on current procedures and processes until such time as a review is completed and recommendations are adopted by the council. A comprehensive review of options for generating revenue is required as an integral part of the operational plan.

Change and Change Management

In any organization, change must be managed to avoid serious opposition. The transition that SLARI is undergoing must be managed. Therefore, a change management unit was established at the directorate to deal with skepticism, opposing views, and other issues that would emerge as SLARI implements the operational plan.

The operational plan calls for organizational and institutional changes that not only need to be developed, described, and budgeted for in detail, but also need to be deliberately managed. It includes significant skills development for current and new staff who will be closely involved in implementation.

There will be a two- to three-year period of special support for the change process. This support will cover the full range of issues and will initiate the operational plan and catalyze the process; it is a necessary condition for successful implementation.

The support includes mentoring and technical advice relating to these changes. Activities are fully integrated into management processes. The overall objective of this change management process is to facilitate and support SLARI in the implementation of its new operational plan and to deliver on the commitment made to its stakeholders in its Strategic Plan.

While it is necessary to have a dedicated change management unit, this will also be a temporary grouping of seconded staff. They will be located in the directorate and report directly to the director general, but will liaise and communicate widely with all staff members and stakeholders in the operational plan.

Research Center Mandate, Status, and Priorities

The basic roles and responsibilities of the research centers can be divided into three categories: research, service, and management. Some preliminary prioritization of research and non-research activities has been performed but will need to be updated and validated by the directorate and stakeholder groups. Resource needs assessments including human and physical resources will also be completed during 2008/09. Concurrently, the strategic and operational plans of the centers that nest within those of SLARI and the program will be developed.

Four of the centers have yet to clearly define and agree to the precise areas of responsibility and crops associated with each. There is currently a broad understanding, but this will be formalized during the first year of the operational plan as priorities are set and resources are allocated.

Organization and Governance

The SLARI Act contains clear statements on the composition and key functions, roles, and responsibilities of the various management elements and structures within the organization. The priority during early implementation is to perform an assessment of the overall governance structures required. This specialist review will produce a detailed *Governance Manual* to cover all aspects of operation, from project field staff to council, and will include the links and processes required to operate. Subsequently, manuals to cover other aspects of the operation of the institute will be developed as part of the activities of the directorate.

The council is the highest administrative and policymaking body under the SLARI Act, with the power to control and supervise the operation of SLARI. It comprises 28 members. Seven of the council members are ex officio.

The council has four committees to support its operation and that of SLARI as an organization, namely:

- Scientific and Technical Committee
- Appointments, Promotion and Disciplinary Committee
- Administration and Finance Committee
- Documentation, Data Management and Information Committee

The positions of director general, deputy director general, and research coordinator are defined in the SLARI Act, and there is provision for appropriate support staff to be appointed as considered necessary for the efficient discharge of SLARI's functions.

Under the SLARI Act, only the positions of director general, deputy director general, and research coordinator are defined; however, the directorate's role is one of oversight and support for implementation of SLARI's strategy through its operational plan. To this end, it needs the capacity to support and facilitate the research centers and their programs.

The exact nature and structure of the support positions will depend on resource availability and need, but priority areas that will receive immediate attention are internal audit, administration, monitoring and evaluation, and program development.

Internal Audit. This position will report directly to the director general and will oversee the appropriate use of funds and resources.

Administration. The priority will be in the development of recommendations for conditions of service to be submitted to the council, as well as the development of terms of reference and recruitment of staff at all levels for rebuilding and establishing the research centers.

Monitoring and Evaluation. As part of the paradigm shift that is integral to this operational plan, it is important that the role of monitoring and evaluation be carried out at the appropriate level and with the appropriate methodology. Systems will be based on the logframe and its indicators, and the focus will be on providing guidance. Monitoring and evaluation will be used as an opportunity to ensure efficient implementation rather than as a chance to criticize activities. Therefore, a learning platform will be created to enable SLARI to correct its mistakes and consolidate its successes.

Program Development. Priorities identified through consultations and approval processes will need to be transformed into viable and effective programs and projects. The directorate will be well placed to provide this support and to coordinate initiatives across the institute. Additional units and capacity within the directorate will be developed as resources become available and in response to specific needs. These will include information and knowledge management, documentation, policy and advocacy for program support, personnel, budget management, and procurement for finance and administration.

Implementation of Operational Plan of SLARI

Within the framework of collaboration, IFPRI assists SLARI to implement its operational plan with various capacity-strengthening activities. For the effective implementation of SLARI's operational plan, SLARI's management and research capacity must be developed through on-the-job mentoring and training. Setting priorities for research activities is important given the scarcity of resources. In addition, developing a viable communication strategy, a participatory monitoring and evaluation system for learning, and a management information system are important ingredients to implement SLARI's operational plan effectively. In this regard, SLARI's collaboration with IFPRI is already under way, as IFPRI is providing training and technical support.

6. CONCLUSION

Sierra Leone is a country that has just emerged from civil war. The civil war, which was caused by a mix of political, social, and economic factors, resulted in incalculable social and economic destruction. Farm families fled rural areas, abandoning their household belongings and productive assets, including land and livestock, which resulted in a huge reduction in livestock numbers in the country. The war damaged resources, impeded production, and destroyed markets. This had a huge impact on the overall economy in general and on the performance of the agricultural sector in particular.

As is the case with other institutions in the country, Sierra Leone's agricultural research system was severely affected by the civil war. Research infrastructure, such as research facilities and equipment, was destroyed; research laboratories were either damaged or abandoned as researchers fled from the research centers. The abandonment of the laboratories led to the deterioration of facilities. Well-trained researchers and scientists fled from research centers and took refuge in Freetown, and some even left the country. Research center leaders were killed by rebels in some areas.

The cessation of hostilities in 2002 brought about an improvement in Sierra Leone's security situation and paved the way for social and economic reconstruction. The government of Sierra Leone concentrated its efforts on resettling persons displaced by the war in their original communities by providing planting materials, livestock, and microcredit schemes (especially for women farmers).

The newly elected government of Sierra Leone (2007) recognized the need to focus on continued rehabilitation of the agricultural sector, in which most of the people are employed. This was reflected in the agricultural sector policy of Sierra Leone, which emphasized the need to reduce poverty and attain food security. The policy places more emphasis than before on the commercialization of agriculture, agricultural mechanization, irrigation, and boosting private sector participation in agriculture and making agriculture the engine for national economic growth.

The agricultural sector review of Sierra Leone (MAFFS 2004) identified the ineffective agricultural research system as one of the constraints of the sector. NARS are required to come up with easily transferable technologies to boost agricultural productivity in developing countries. After the civil war, agricultural research in Sierra Leone was coordinated under the NARCC until the SLARI Act was passed by the parliament of Sierra Leone in 2007. Consequently, SLARI was made the umbrella organization to generate agricultural research and agricultural technology for the benefit of the farming, fishing, and forestry sectors in Sierra Leone and to provide for other related matters.

As a new organization, SLARI needed to make some strategic decisions to guide its operations in order to make it effective in responding to the demands of stakeholders within the agricultural sector. These strategic decisions included the reorganization of SLARI to link the agricultural research agenda with national development priorities, and the development of the strategic plan and operational plan. To bring synergy with regional and subregional strategies, the SLARI plans were nested within those of FARA and CORAF/WECARD. By so doing, SLARI can contribute to CAADP Pillar IV (science and technology development, dissemination, and adoption) and its associated agricultural productivity program (FAAP).

SLARI deliberately pursued organizational innovation by harmonizing the way in which agricultural research for development is addressed in Africa. As a result, through coherence with CAADP it is possible for all NARS, subregional organizations, and FARA, as the overarching forum for agricultural research, to work toward a single objective. This was the first time a national Operational and associated strategic plan have been deliberately designed on CAADP and FAAP principles, making them coherent with subregional and regional plans for agricultural

research and creating synergy between the NARS and subregional and regional research institutes. This integration also assists in fund-raising; supports efforts at the national level to help achieve objectives at the subregional and regional level; and allows increased coordination, interaction, interlinkages, partnerships, and networks among the various agents associated with agricultural research for development systems.

The agricultural research system of Sierra Leone now has a strategic plan and operational plan to guide it as it pursues its vision and mission and to enable it to deliver results that will contribute to the achievement of its objectives. The plan must be implemented for the results to be achieved, and this requires funds and commitment from all stakeholders, especially the government of Sierra Leone.

APPENDIX A. SUPPLEMENTARY TABLES

Appendix Table A.1. Crop yield level in West Africa, irrigated (2000–2004 average, ton/ha)

	Rice	Vegetable Ex.	Fruit Ex.
Burkina Faso	3.2	20.9	39.4
Chad	2.6	25.8	NA
Gambia	3.0	13.2	10.8
Guinea Bissau	2.6	12.8	12.5
Mali	2.6	16.4	42.4
Mauritania	4.5	8.2	7.5
Niger	5.6	NA	NA
Senegal	4.2	44.4	14.1
Guinea	3.3	7.5	6.8
Sierra Leone	2.3	16.4	8.5
Côte d'Ivoire	5.6	20.7	42.1
Ghana	3.3	11.5	12.5
Togo	3.4	33.1	11.4
Benin	2.6	9.5	13.9
Nigeria	2.8	16.7	13.4
Cameroon	4.0	11.2	17.9
Central African Republic	NA	20.2	NA
Gabon	NA	NA	NA
Congo Republic	NA	NA	NA
Congo (DRC)	2.6	26.6	NA
West Africa average	2.9	15.8	12.7

Source: IFPRI (2006)

Vegetable Ex: Exportable vegetables

Fruit Ex.: Exportable fruits

NA = Not Available

Appendix Table A.2. Crop yield level in West Africa, rainfed (2000–2004 average, ton/ha)

	Maize	Rice	Sorghum	Millet	Cassava	Sweet potato	Groundnut	Vegetable Do.	Fruit Do.	Banana	Sugar, raw	Cocoa	Coffee	Oil palm
Burkina Faso	1.6	1.0	0.9	0.8	2.0	8.2	0.8	8.3	5.2	NA	NA	NA	NA	NA
Chad	0.7	0.9	0.7	0.5	11.7	2.6	0.9	10.2	4.0	NA	NA	NA	NA	NA
Gambia	1.4	1.8	1.1	1.0	3.0	NA	1.0	5.1	4.5	NA	NA	NA	NA	0.6
Guinea Bissau	1.3	1.1	0.8	0.8	15.3	NA	1.2	5.1	6.2	3.1	27.5	NA	NA	0.8
Mali	1.1	0.9	0.7	0.6	11.0	13.9	0.8	6.4	12.2	NA	NA	NA	NA	NA
Mauritania	0.9	NA	0.4	0.2	NA	1.0	0.8	1.3	3.2	NA	NA	NA	NA	NA
Niger	0.8	2.8	0.2	0.4	21.0	15.4	0.6	12.3	4.9	NA	36.9	NA	NA	NA
Senegal	1.5	1.1	0.8	0.6	5.6	5.0	0.8	14.4	6.9	17.3	NA	NA	NA	0.8
Guinea	1.1	1.4	0.8	0.8	5.1	3.0	1.3	3.0	3.5	4.7	52.7	0.4	0.4	0.2
Sierra Leone	0.9	1.4	1.0	1.0	5.3	2.5	0.8	6.1	4.1	5.6	72.2	0.4	1.1	1.0
Côte d'Ivoire	0.9	2.1	0.5	0.8	5.1	2.2	1.0	5.8	6.8	4.0	NA	0.6	0.4	0.3
Ghana	1.5	2.0	1.0	0.8	9.5	1.4	1.0	4.6	5.8	8.1	25.5	0.5	0.2	0.3
Togo	1.2	1.9	0.8	0.5	6.0	1.1	0.5	4.9	5.2	7.1	NA	0.3	0.3	0.8
Benin	1.1	1.9	0.9	0.8	8.8	5.1	0.8	4.0	6.8	5.2	NA	0.3	0.2	0.8
Nigeria	1.2	1.0	1.2	0.9	11.4	4.2	0.8	5.9	5.5	5.4	NA	0.2	0.9	0.2
Cameroon	1.3	1.6	0.9	0.7	8.7	5.0	0.7	3.8	5.8	6.5	10.0	0.5	0.3	0.8
Central African Republic	1.0	1.9	0.8	0.9	2.9	NA	1.1	8.1	4.8	4.2	7.2	0.4	0.5	0.6
Gabon	1.5	2.0	NA	NA	5.1	1.8	0.9	6.6	1.6	5.5	58.8	0.1	0.3	NA
Congo Republic	0.8	0.7	NA	NA	9.1	6.8	0.6	6.5	6.4	7.8	36.7	0.3	0.3	0.4
Congo (DRC)	0.8	0.7	0.7	0.7	8.1	5.0	0.8	6.2	14.9	4.3	43.2	0.3	0.4	0.3
West Africa average	1.1	1.4	0.7	0.6	7.7	4.2	0.9	6.4	5.9	4.4	18.5	0.2	0.3	0.4

Source: IFPRI (2006)

Vegetable Do.: Domestic vegetables

Fruit Do.: Domestic fruits

NA = Not Available

Appendix Table A.3. Conflicts and economic performance in West Africa, 1995–2004

		Positive GDP per Capita Growth ¹		Negative GDP per Capita Growth	
		Quick recovery	Slow recovery	Quick recovery	Slow recovery
No war		Benin Burkina Faso Gambia Ghana Mali Mauritania		Togo	
at least 1 year in war	Minor conflicts ²	Cameroon Guinea Nigeria Chad		Niger	Central African Rep Côte d'Ivoire
	Intermediate conflicts ³	Senegal			
	Severe wars ⁴				Congo, Dem Rep Guinea Bissau Congo, Rep Sierra Leone

Source: IFPRI (2006)

Note:

War data are from Harbom and Wallensteen (2005)

¹GDP Per capita growth is measured in constant 2000 U.S. dollars (World Bank 2006).

²The definition of minor conflicts is at least 25 battle-related deaths per year for every year in the period.

³Intermediate conflicts result in more than 25 battle-related deaths per year and a total conflict history of more than 1,000 battle-related deaths, but fewer than 1,000 per year.

⁴Severe wars result in at least 1,000 battle-related deaths per year.

Appendix Table A.4. Logical framework for Strategic Plan of SLARI

Narrative Summary	Basis for Verifiable Outcome Indicators ⁵	Means of Verification	Assumptions
General Objective Broad-based agricultural growth sustainably improved	<ol style="list-style-type: none"> 1. Sustainable improvements in agricultural GDP by 2017 2. Positive increases in the level of the commercialization of agriculture by 2017 	<ul style="list-style-type: none"> • Reports from the National Statistics Office • Reports from the Chamber of Commerce (private sector organizations) • Ministry of Trade annual reports • Ministry of Agriculture, Forestry and Food Security annual reports • Ministry of Fisheries and Marine Resources annual reports 	Not applicable at this level ⁶

⁵ For the Strategic Plan, which covers a 10-year period, and especially for the purposes of the logframe, the requirement is for broad areas in which outcomes or impact will be measured. These will be used to develop more detailed and specific indicators in Operational and Work Plans to determine that results have been delivered, the specific objective has been achieved, and a significant contribution has been made to the general objective.

⁶ Assumptions here refer to those that must be made if some (undefined) super-objective is to be achieved. These would focus on the performance of other sectors in the economy and their contributions to such things as food security and poverty reduction; inclusion here is not appropriate.

Appendix Table A.5. Logical framework for Strategic Plan of SLARI (continued)

Narrative Summary	Basis for Verifiable Outcome Indicators ⁷	Means of Verification	Assumptions
Specific Objective Agricultural productivity, markets, and marketing improved	1. Increases in the volume of national and subregional trade to be expected by 2017 2. Reduction of prices for key agricultural products, as given by the rural food price index, by 2017	<ul style="list-style-type: none"> • Reports from the National Statistics Office • Ministry of Trade annual reports • Ministry of Agriculture, Forestry and Food Security annual reports • Ministry of Fisheries and Marine Resources annual reports • Reports from the Chamber of Commerce (private sector organizations) • Reports from the Economic Community of West African States (ECOWAS) and other subregional and regional organizations • Reports of external evaluations 	<p>Specific objective to general objective[not sure what this means...]</p> <ul style="list-style-type: none"> • Adequate political stability and commitment exists and is maintained at the appropriate level of government • Appropriate national, subregional, and international trade policy is supportive • Relevant existing policy or law is supportive and effectively enforced • Biodiversity loss and environmental degradation do not adversely influence gains • Morbidity and mortality due to HIV/AIDS, tuberculosis, and malaria do not adversely affect gains or benefits • Appropriate national and international financial and legal commitments and obligations are met • Land tenure systems are appropriate and supportive legislation is enforced effectively • No natural and/or environmental disasters or incidents occur • Research-extension-farmer networking, linkages, and operations are adequately resourced and able to function effectively

⁷ For the Strategic Plan, which covers a 10-year period, and especially for the purposes of the logframe, the requirement is for broad areas in which outcomes or impact will be measured. These will be used to develop more detailed and specific indicators in Operational and Work Plans to determine that results have been delivered, the specific objective has been achieved, and a significant contribution has been made to the general objective.

Appendix Table A.6. Logical framework for Strategic Plan of SLARI (continued)

Narrative Summary	Basis for Verifiable Outcome Indicators ⁸	Means of Verification	Assumptions
Results continued 1. Appropriate policy recommendations developed and promoted	<ul style="list-style-type: none"> Numbers of effective, revised, or new agricultural and agriculturally related policies promulgated and enforced Improvements in adequate and timely availability, accessibility, and affordability of agricultural inputs Increases in the number of harmonized initiatives between stakeholders, both nationally and internationally Increases in the resources provided and available for agricultural research and development activities 	As above	<i>Continued from above...</i> <ul style="list-style-type: none"> Social and religious institutions do not adversely affect gains No natural and/or environmental disasters or incidents occur Research-extension-farmer networking, linkages, and operations are adequately resourced and able to function effectively

⁸ For the Strategic Plan, which covers a 10-year period, and especially for the purposes of the logframe, the requirement is for broad areas in which outcomes or impact will be measured. These will be used to develop more detailed and specific indicators in Operational and Work Plans to determine that results have been delivered, the specific objective has been achieved, and a significant contribution has been made to the general objective.

Appendix Table A.7. Logical framework for Strategic Plan of SLARI (Continued)

Narrative Summary		Basis for Verifiable Outcome Indicators ⁹		Means of Verification	Assumptions
2. National capacity for research and technology development strengthened	Results continued	3.1	Numbers and type of agricultural research centers established, resourced, and effectively maintained	As above	As above
		3.2	Improvements in agricultural research and development performance, including, inter alia, publications, partnerships, ability to respond to demand, and ability to articulate demand		
		3.3	Improvements in the empowerment of stakeholders and in their ability to articulate and respond to demand for agricultural research and development solutions to problems		
3. Collaboration and coordination between stakeholders strengthened		4.1	Increases in the active membership of research and stakeholder organizations		
		4.2	Increases in the numbers and percentage of stakeholder participation in activities related to agricultural research and development		
4. Knowledge and information management systems established and operationalized		5.1	Increases in the uptake of agricultural technologies and innovations		
		5.2	Improvements in the capacity of agricultural research and development professionals to respond to demand		
		5.3	Improvements in the access of stakeholders to information to generate more effective agricultural technologies		

⁹ For the Strategic Plan, which covers a 10-year period, and especially for the purposes of the logframe, the requirement is for broad areas in which outcomes or impact will be measured. These will be used to develop more detailed and specific indicators in Operational and Work Plans to determine that results have been delivered, the specific objective has been achieved, and a significant contribution has been made to the general objective.

Appendix Table A.8. Logical framework for Strategic Plan of SLARI (continued)

Narrative Summary		Budgets and Inputs	Assumptions
Activities		To be determined after the Operational Plan is devised	Activities to Results[not sure what this means]
Result 1	Appropriate technologies and innovations generated and promoted		<ul style="list-style-type: none"> • Adequate political stability and commitment exists and is maintained at the appropriate level of government • An adequate and stable economic environment exists and is maintained • Morbidity and mortality due to HIV/AIDS, tuberculosis, and malaria do not adversely affect gains or benefits • Public infrastructure exists and is maintained at appropriate levels supporting physical access to markets • Appropriate national and international financial and legal commitments and obligations are met • Research-extension-farmer networking, linkages, and operations are adequately resourced and able to function effectively
1.1	Determine and quantify the status of needs and opportunities for research within the country, by district and agro-ecological zone		
1.2	Develop and strengthen partnerships		
1.3	Develop mechanisms for effective technology and innovation generation and implementation		
1.4	Support diffusion and exchange of technological innovations		
1.5	Diversify the framework for diffusion and dissemination of information		
1.6	Utilizing a broad selection of mechanisms and media, promote the output from stakeholder-based activities, including:		
1.6.1	Technologies and innovations		
1.6.2	Commercial products as business opportunities		
1.6.3	Decision-making tools		
1.6.4	Policy options		
1.6.5	Information systems		

Appendix Table A.9. Logical framework for Strategic Plan of SLARI (continued)

	Narrative Summary	Budgets and Inputs	Assumptions
Activities continued			
Result 2	Appropriate policy recommendations developed and promoted		
2.1	Identify market constraints and opportunities, including an analysis of existing agricultural policy		
2.2	Develop mechanisms to improve regional and international trade		
2.3	Promote market information systems		
2.4	Identify institutional constraints, including an analysis of major agricultural institutions in the subregion		
2.5	Develop mechanisms to enhance institutional response to the production-consumption continuum		
2.6	Harmonize processes for priority products (policies)		
2.7	Harmonize and operationalize framework and procedures for quality control		
2.8	Develop lobbying strategies (advocacy)	As above	As above
Result 3	National capacity for research and technology development strengthened		
3.1	Identify capacity needs and constraints of SLARI and relevant stakeholders		
3.2	Establish, strengthen, and sustain SLARI research centers (existing and proposed)		
3.3	Establish, strengthen, and sustain competitive funds for agricultural research and development		
3.4	Develop and promote agricultural knowledge management systems		
3.5	Promote existing capacity-strengthening interventions		
3.6	Strengthen the capacity of stakeholders to analyze the value chain of priority products and the commercial policies of the agricultural sector		

Appendix Table A.10. Logical framework for Strategic Plan of SLARI (continued)

	Narrative Summary	Budgets and Inputs	Assumptions
Activities continued			
Result 4	Collaboration and coordination between stakeholders strengthened		
4.1	Identify needs and constraints of existing SLARI partnerships with relevant stakeholders		
4.2	Identify new opportunities for partnerships and collaboration		
4.3	Develop mechanisms to strengthen collaboration and partnerships between SLARI and ensure an enhanced communication system		
Result 5	Knowledge and information management systems established and operationalized		
5.1	Identify the constraints, needs, and opportunities for national information and communication systems	As above	As above
5.2	Establish linkages with the regional and subregional knowledge management systems and formulate operational mechanisms		
5.3	Develop a national strategy for communication and advocacy		
5.4	Develop a national database on agricultural research and development outputs		
5.5	Support agricultural research centers and partners in the collection and exchange of agricultural information		
5.6	Develop national and subregional-level market information systems for priority products		

Appendix Table A.11. Summary of key elements of SLARI Operational Plan logical framework

Narrative Summary	Assumptions
General Objective	
Broad-based agricultural growth sustainably improved	
Specific Objective	
Agricultural productivity, markets, and marketing improved	<ul style="list-style-type: none"> • Adequate political stability and commitment exists and is maintained at the appropriate level of government • Appropriate national, subregional, and international trade policy is supportive • Relevant existing policy or law is supportive and effectively enforced • Biodiversity loss and environmental degradation do not adversely influence gains • Morbidity and mortality due to HIV/AIDS, tuberculosis, and malaria do not adversely affect gains or benefits • Appropriate national and international financial and legal commitments and obligations are met • Land tenure systems are appropriate and supportive legislation is enforced effectively • No natural and/or environmental disasters or incidents occur • Research-extension-farmer networking, linkages, and operations are adequately resourced and able to function effectively
Results	
<ol style="list-style-type: none"> 1. Appropriate technologies and innovations generated and promoted 2. Appropriate policy recommendations developed and promoted 3. National capacity for research and technology development strengthened 4. Collaboration and coordination between stakeholders strengthened 5. Knowledge and information management systems established and operationalized 	<ul style="list-style-type: none"> • Adequate political stability and commitment exists and is maintained at the appropriate level of government • Appropriate national, subregional, and international trade policy is supportive • Relevant existing policy or law is supportive and effectively enforced • Biodiversity loss and environmental degradation do not adversely influence gains • Appropriate national and international financial and legal commitments and obligations are met • Land tenure systems are appropriate and supportive legislation is enforced effectively • Morbidity and mortality due to HIV/AIDS, tuberculosis, and malaria do not adversely affect gains or benefits • Social and religious institutions do not adversely affect gains • No natural and/or environmental disasters or incidents occur • Research-extension-farmer networking, linkages, and operations are adequately resourced and able to function effectively

Source: SLARI (2007a)

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